MODERN PLASTICS

JUNE 1959

PHOTOGRAPHED FOR MODERN PLASTICS BY EDITH PAUL MARSHALL

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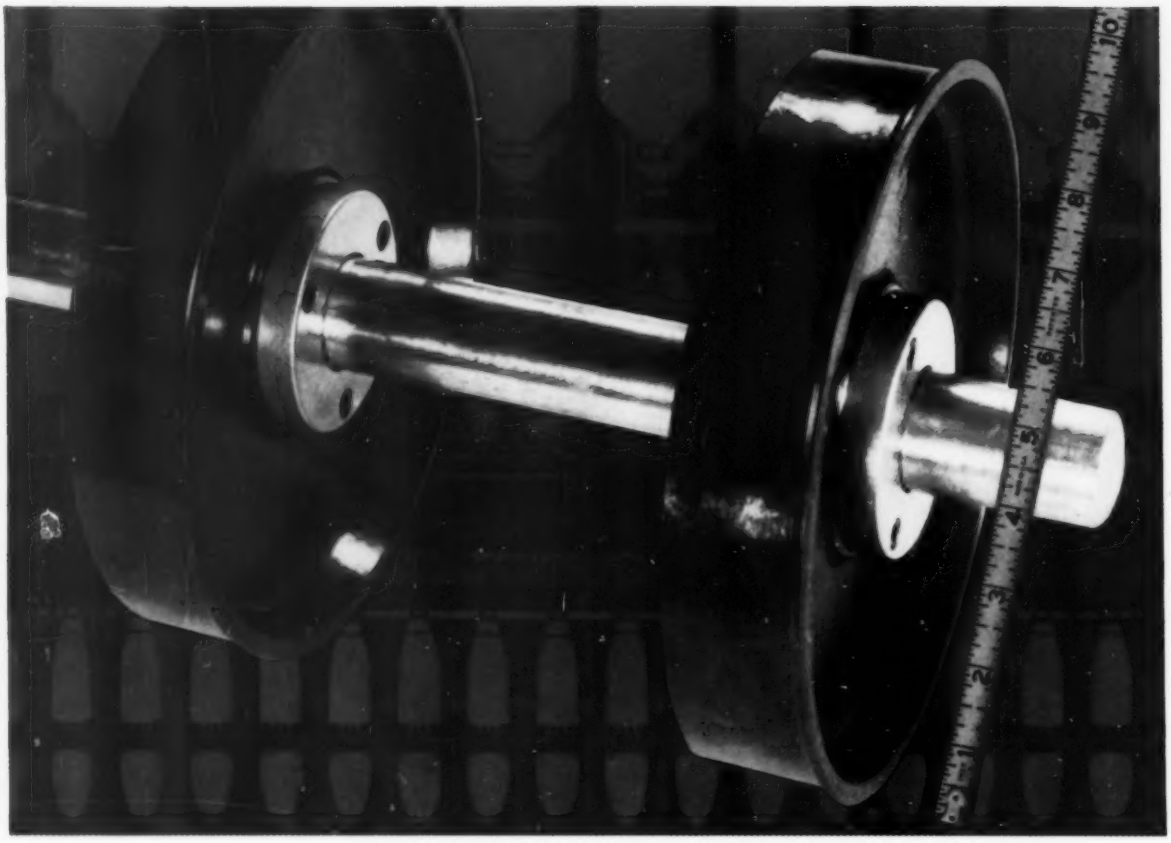

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MODERN

• THE PLASTISCOPE

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• EDITORIAL

Hazards in film misuse must be taught parents **262**

There's been a lot of publicity on the death of a number of infants reportedly by suffocation in polyethylene film. The industry must take a stand on this latest safety problem.

• GENERAL

Why the fast-growing market for big polyethylene containers? **85**

With seven basic manufacturing techniques available, companies engaged in the handling or processing of problem liquids now have their choice of king-size PE containers ranging from 15- to 500-gallon capacities. Lower costs, lighter weights, and corrosion resistance make polyethylene a natural for this application. Each technique is outlined and the respective advantages indicated.

Bowling gets new look for more business **91**

Within the next five years the U. S. bowling population is expected to reach the impressive total of 35 million. To attract as large a share of this business as possible, bowling centers have turned to reinforced plastics and polystyrene to give their emporiums a new look of greater beauty and functionality.

For better garden tools—high-density polyethylene **94**

Why did a lawn mower manufacturer and a maker of garden food spreaders turn to high-density polyethylene for their latest products? Merchandising advantages based on redesign of the implements, better price structures, lighter weights, and improved properties were the deciding factors.

All-vinyl footwear outlasts leather, costs less **96**

Produced from injection molded and fabricated sheet components, new children's shoes offer increased wear at a fraction of the usual price. By going to vinyl, one manufacturer was able to reduce fabricating operations from 180 to eight per shoe. Details of production are given and the cost picture spelled out.

How to cut scrap losses **98**

Incorporation of automatic scrap handling equipment in molding and extrusion operations can save the processor thousands of dollars a year. Two typical installations are traced step by step, and dollar and cent figures are given, including cost of installation.

The urethanes grow up—Part 3 ..... **101**

Coatings and elastomers based on polyurethane match foams based on the same material in their extreme range of versatility. Numerous cases are cited to show the substantial contributions these materials make in terms of improved products and more economical operation to a surprisingly diversified range of end users.

Truck payload up **105**

New process of molding reinforced plastics by a centrifugal "casting" method promises to bring new economies to the production of fibrous glass—reinforced plastics pressure vessels. These units replace metal components in trucks—reducing weight and increasing payload.

Plastics at the AMA Packaging Show .. **214**

An on-the-spot report on the latest plastics developments in packaging as revealed at the latest packaging exposition.

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Please mail all correspondence, change of address notices, subscription orders, etc., to above address.

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PLASTICS*

JUNE 1959
Volume 36 Number 10

• ENGINEERING

Sealability of polyethylene films **107**

The authors propose a brand new method for determining this elusive quality and divorcing it from such factors as operating conditions and film thickness. *By James M. McKelvey and T. H. Strome.*

Blow molding polyethylene—Part 2 . . **115**

How certain "quality" factors—appearance, weld at the seal, uniformity of wall thickness, and shrinkage—are influenced by processing conditions is discussed. Optimum values for a range of variables are indicated. *By R. L. Wechsler and T. H. Baylis.*

How Ford automates polyester premixing **128**

Details of an integrated operation that makes a better product at reduced material cost and 60% savings in time. Hourly rate of premix production varies from 1800 to 2400 lb. *By K. A. Mack.*

• TECHNICAL

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The advantages of isophthalic acid resins in glass reinforced laminates and moldings are outlined. Details of properties are also given. *By Earl E. Parker.*

Stress cracking of polyethylene **140**

The American Society for Testing Materials has been trying for some time to establish test methods to evaluate the stress cracking behavior of different polyethylenes. So far, the efforts have not been successful. Pending the formulation of such a test, work has been done in Italy on the development of workable procedures and is reported here. *By U. Pelagatti and G. Baretta.*

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White and pastel shades of vinyl coated fabrics are turning pink in certain environments. Investigation has disclosed the cause and remedy of this phenomenon. *By T. A. Girard and C. F. Koda.*

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Coming Up

The excitement about, and enthusiasm for the epoxies continues unabated, and our July lead, starting off a series of 16 or more articles (in groupings) on the subject should be of interest to many people. . . . In spite of several unclear patent situations, blow-molding is rapidly becoming a method of production for many people in many fields. A July feature will deal with the economies of a variety of blow-molding techniques. . . . Engineering section will present the first quantitative study on electrical-discharged treatment of polyethylene film for printing. . . . Also number three in the series on how to overcome problems in premix molding.

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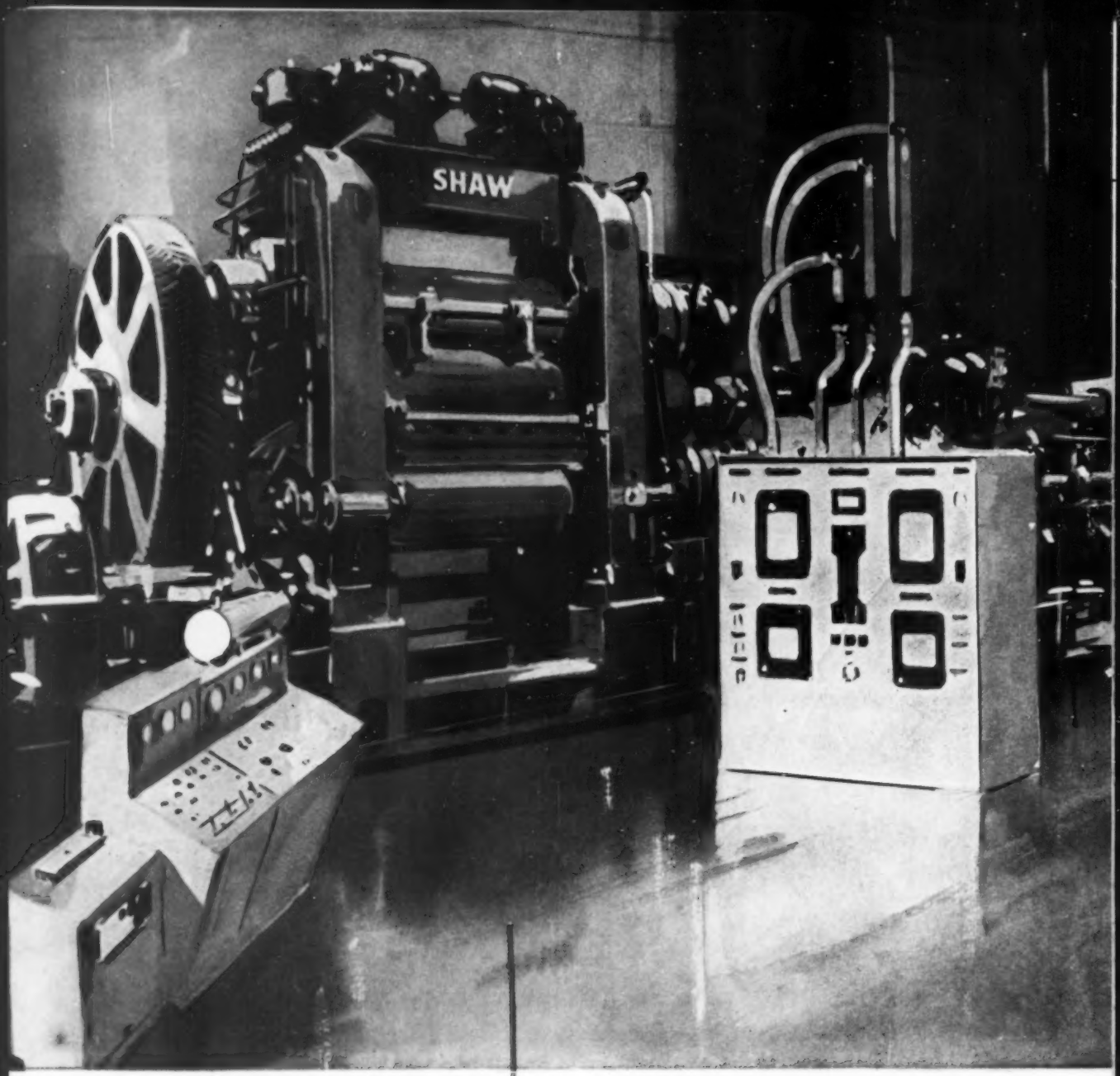

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OVERSEAS AGENTS THROUGHOUT THE WORLD

P.2807

News about

B.F.Goodrich Chemical *raw materials*

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. . . till the cones were made from GEON

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For information on Geon polyvinyl raw materials, write Dept. AF-4, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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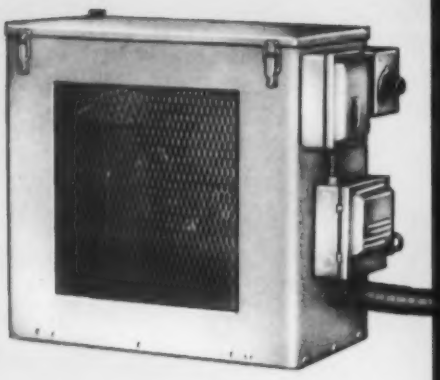

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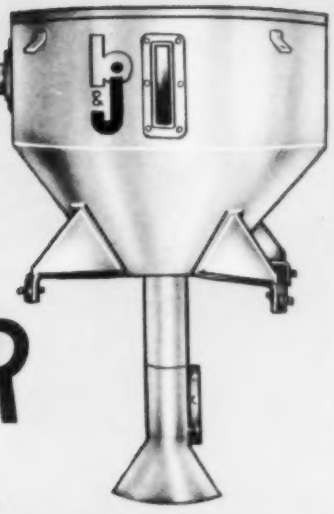

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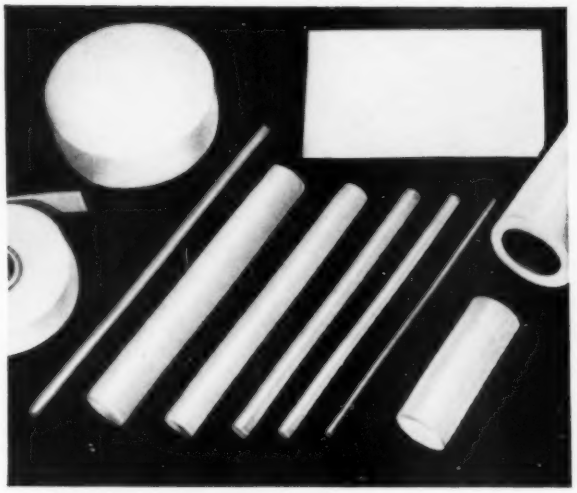

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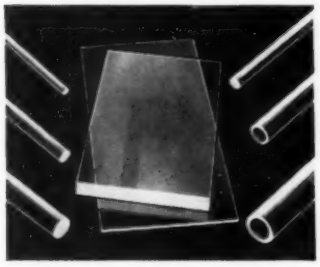

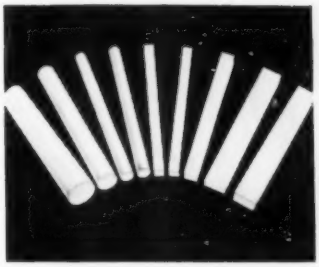

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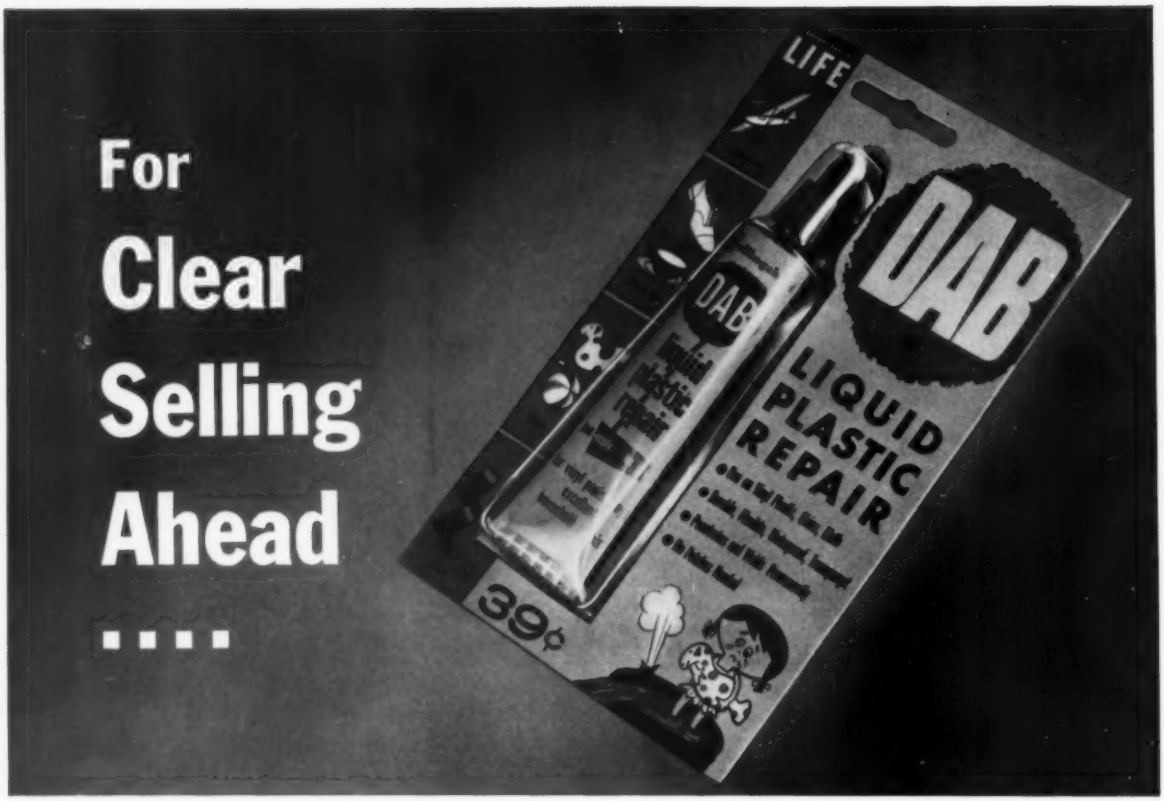

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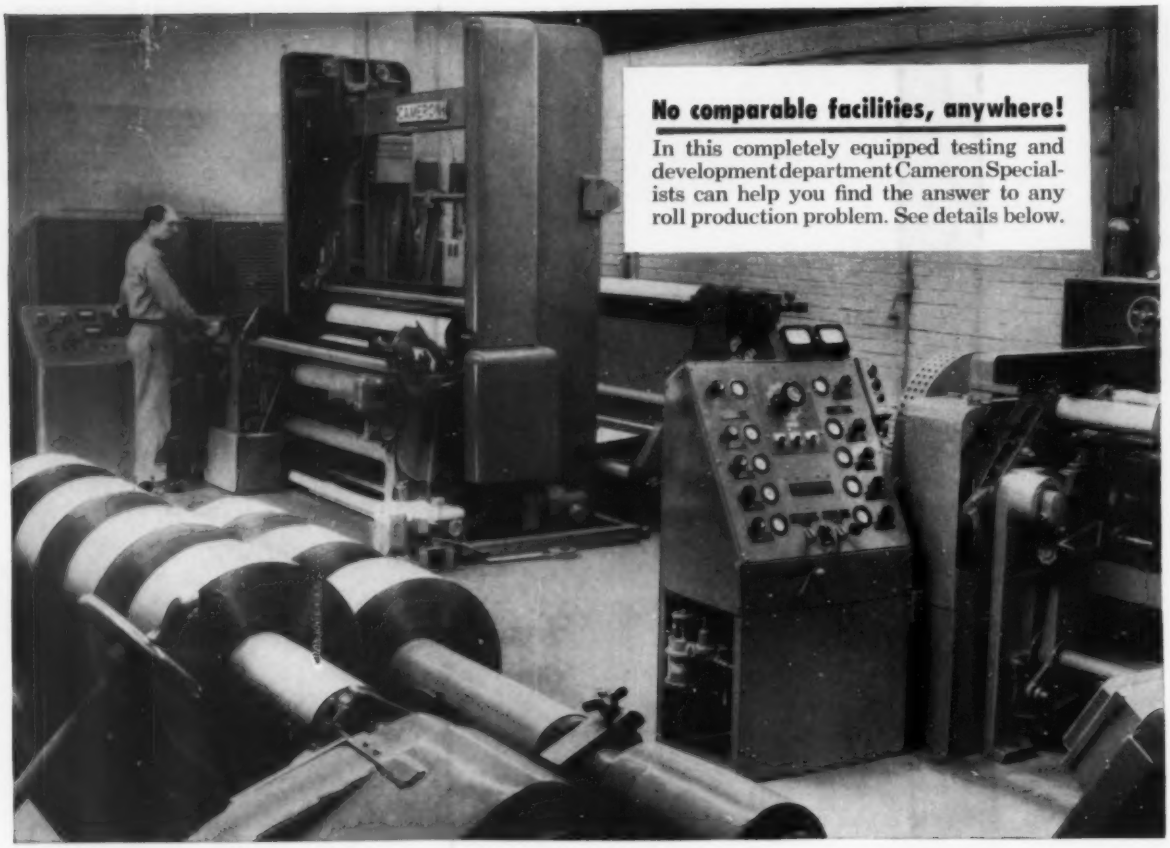

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What about the cost? PLIOVIC S50 reduces raw material costs from ½ to 2 cents per pound of record compound. For all the facts on this outstanding vinyl resin—including latest *Tech Book Bulletins*—write Goodyear, Chemical Division, Dept. F-9422, Akron 16, Ohio.

GOODYEAR

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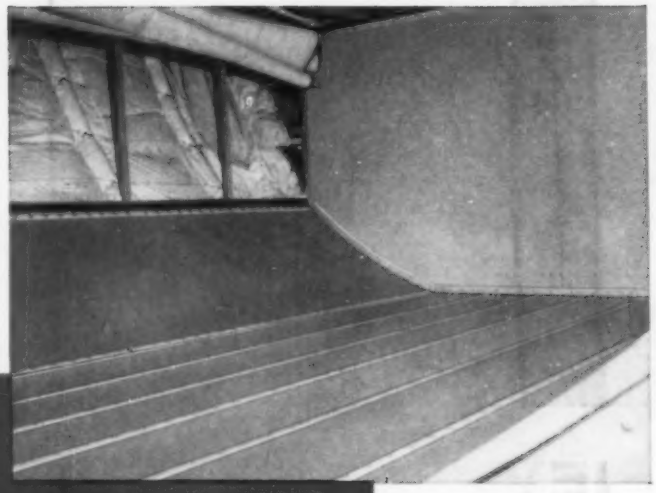

Inside the new Convair 880, strips of Spencer Nylon are used in the cargo area to attach floor panels to structure of aircraft, as well as to serve as a slide strip for cargo. (See story below.)

How Spencer Nylon helps cut weight in world's fastest jet transport:

When you specify materials to be used in building an airplane that will carry 8,630 pounds of cargo at a top cruising speed of 615 mph, every ounce counts. You must keep weight low to get maximum payload, yet you cannot sacrifice strength and durability.

That's why Spencer Nylon 606 is being used for the cargo slide strips in the new Convair 880—the world's fastest jet transport.

Even lighter than aluminum, the Spencer Nylon cargo slide strips are also smoother than aluminum! About 580 feet of Spencer Nylon cargo slide strips are used in every Convair 880.

Extruded by W. S. Shamban & Co. of Culver City, California, and Fort Wayne, Indiana, the nylon slide strips have the extreme abrasion resistance and low friction properties needed to withstand the punishment of loading and unloading cargo.

Why Spencer Nylon? Shamban reports that they chose Spencer Nylon for two reasons: (1) Spencer Nylon extrudes better and (2) holds the shape while maintaining close tolerances.

Add to this the light weight and high impact resistance of Spencer Nylon, and you can see why so many designers and manufacturers are turning to Spencer Nylon for the answer to a wide variety of problems.

If you would like to know more about the special properties of Spencer Nylon, write to Spencer Chemical Company, Dwight Building, Kansas City 5, Missouri.

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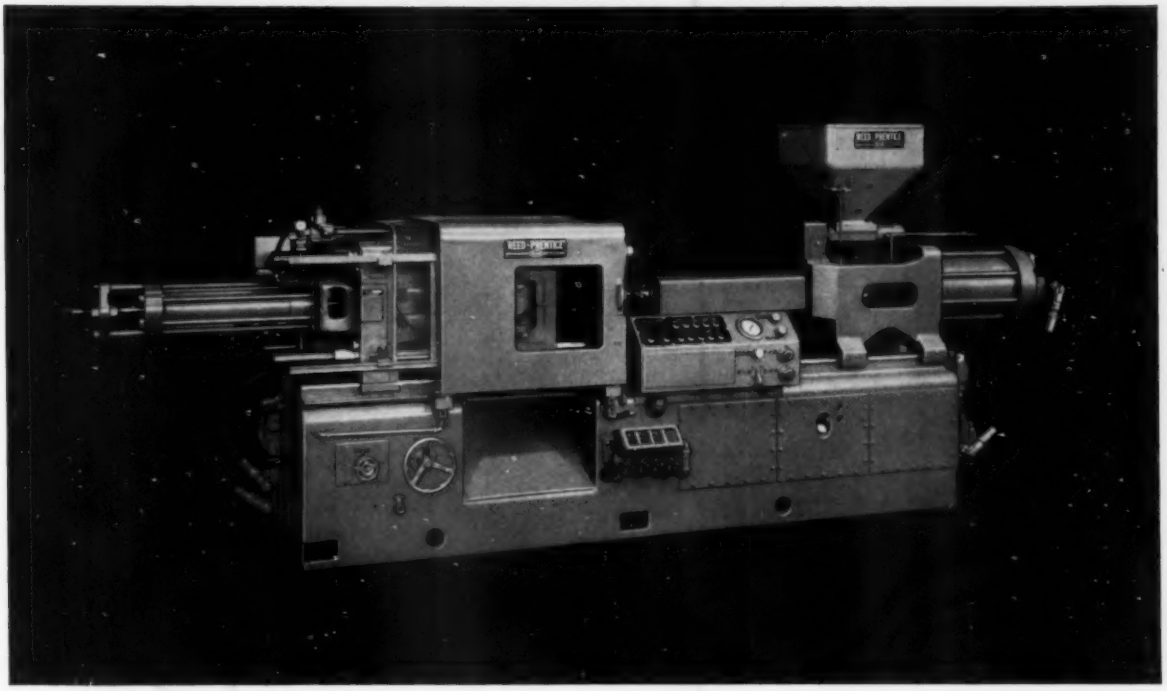

NEW REED 275TA-8/10 oz.

gives you longer stroke . . . larger platens

Here's another new Reed-Prentice injection molding machine designed to keep molders ahead of fast-rising production costs. The 275TA has been developed to handle larger molds at high speeds, provide a longer stroke. It is equipped with a completely redesigned safety circuit. These extra features add up to lower unit costs and greater profits to the molder. Look at these big features on the new REED 275TA.

▸ **LARGER PLATENS.** Die plate measures 27 x 27¼, provides a 15½ x 15½ inch space between tie bars.

▸ **NEW, ADJUSTABLE LONG-STROKE.** Redesigned link end gives a longer, more flexible adjustable mold clamping stroke. You get more than a 50% increase in mold depth.

▸ **NEW SAFETY CIRCUIT.** Front safety door is equipped with double limit switches and a hydraulic lock. The limit switches are interlocked with a hydraulic arrangement that is self-monitoring. If any part of the safety circuit fails, the machine will open and stop, providing the ultimate in personal safety.

▸ **FASTER, EASIER SETUP.** Hydraulically-operated die space adjustment and plunger housing speed setups, eliminate nozzle breakage.

All REED injection molding machines are designed to boost output and cut production costs . . . to keep profits at a high level. For complete information on the new 275TA and the full line of REED injection molding machines, call your nearest REED Sales Engineer.

NEW 275TA SPECIFICATIONS

Mold Clamping pressure, tons	275
Mold clamping stroke (adjustable)	6¼ to 11½"
Platen Size (Horizontal & Vertical)	27 x 27¼"
Diameter of Tie Bars	3½"
Space between tie bars	15½ x 15½"
Plasticizing Capacity (lbs. per hour)	120
Cycles per hour (maximum)	470

REED-PRENTICE

division of **PACKAGE MACHINERY COMPANY**

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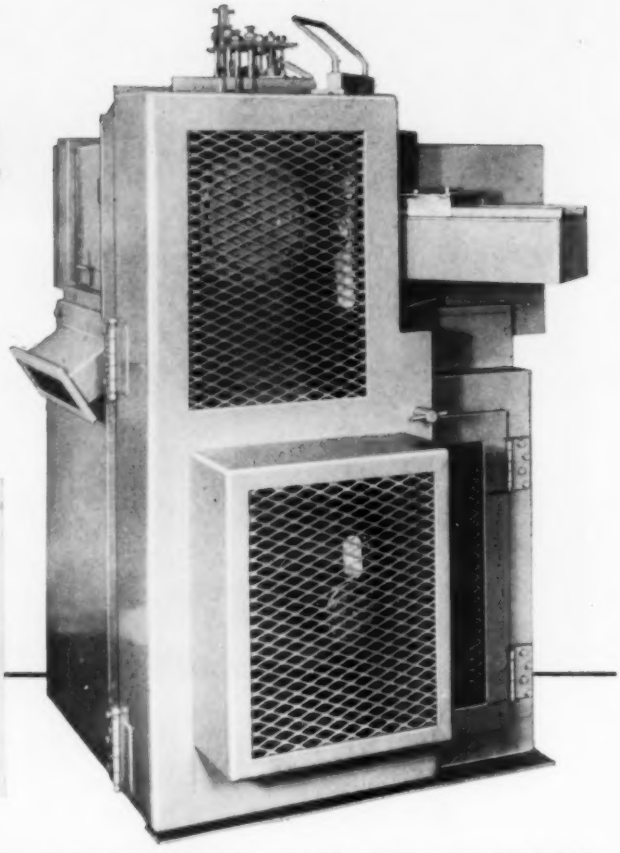
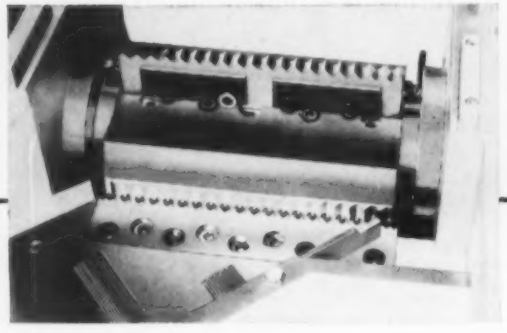
Cumberland
"Stair-Step" DICING MACHINE





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LARGE THROAT GRANULATORS

Minimum floor area needed. Five new throat sizes available. 7"x10", 8½"x12", 8½"x16", 12"x16", 12"x20".

CUMBERLAND PELLETIZING MACHINE

New feed roll mechanism provides better control of extruded strands of plastic materials. Cuts cubes or pellets 1/32" to 1/2". 14" and 24" openings.

Cumberland
ENGINEERING COMPANY, INC.

316-7

PERFECT RESULTS Exclusive 45° feed produces perfect cubes or rectangle pellets in sizes 1/16" to 1" in one severing operation — rotor knives cutting against one stationary knife.

VERSATILITY Dices wide range of extruded or milled thermoplastic ribbon, or sheet stock. TWO standard sizes to accommodate 7" or 14" stock. Special sizes built to order.

QUALITY CONSTRUCTION Ruggedly built. All surfaces contacting plastics materials are of corrosion resistant metals, stainless steel or chromium plated.

Watch for future ads featuring other outstanding Cumberland machines, and write for Bulletin 590.

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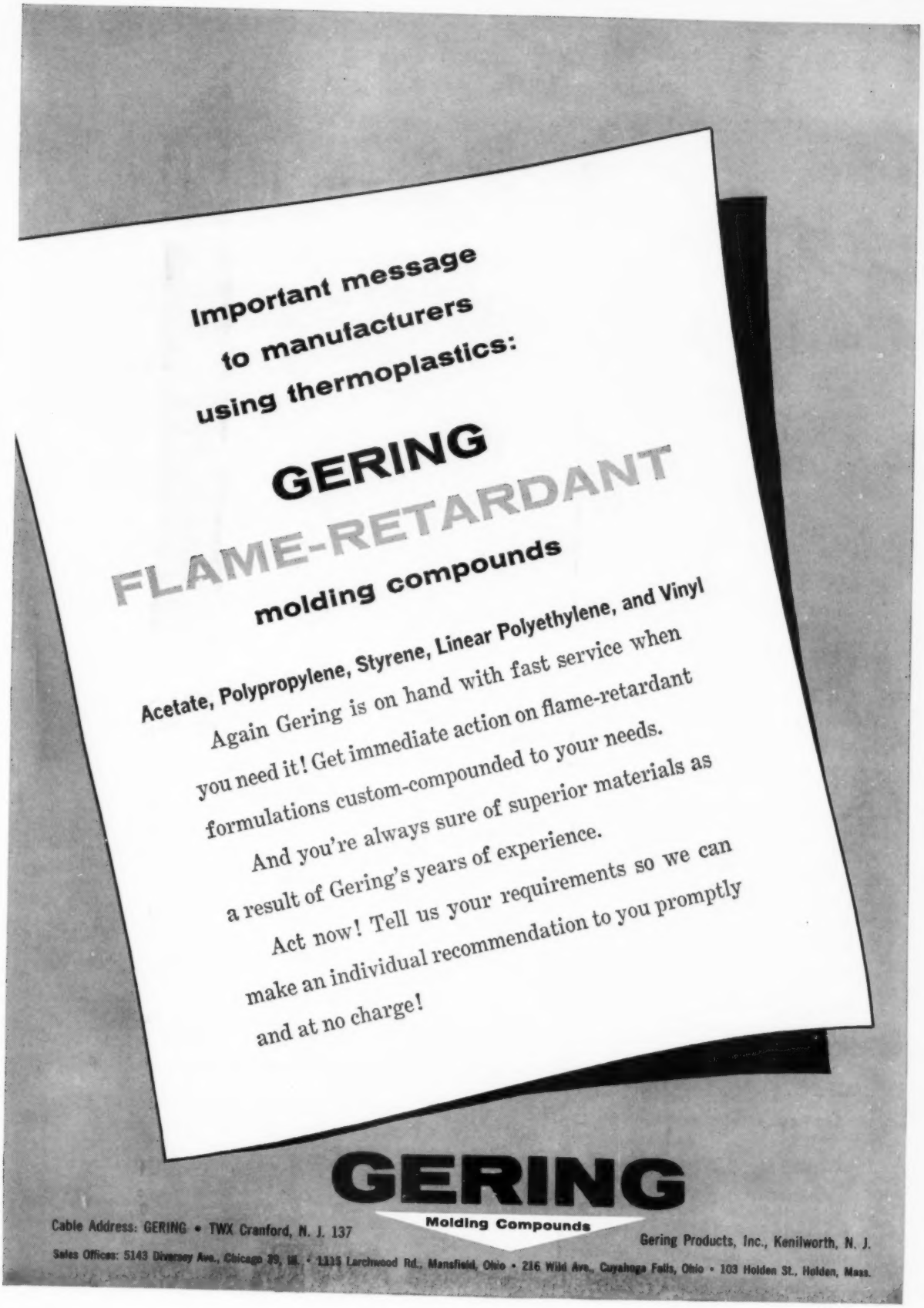
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to manufacturers
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Again Gering is on hand with fast service when you need it! Get immediate action on flame-retardant formulations custom-compounded to your needs.
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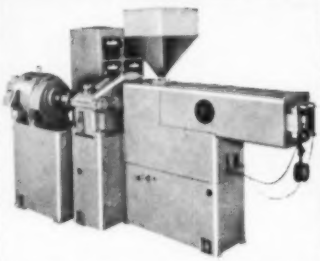
MODEL EVF-100-20
1" VENTED LAB EXTRUDER



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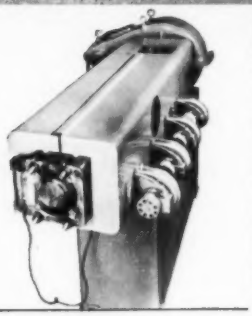
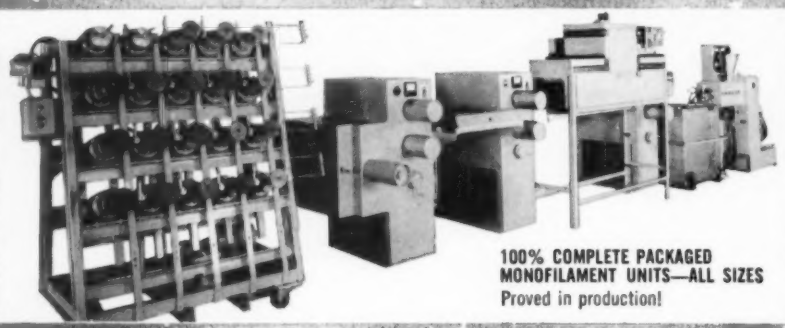
AIR-COOLED PLASTIC EXTRUDER
With directly coupled 15 H.P. Reliance drive, Z-Nickel Screw and stainless steel lined hopper hole



MODEL ESF-250-20
AIR-COOLED PLASTIC EXTRUDER
(SIDE FEED FOR SCRAP RECLAIMING)
Available in all sizes



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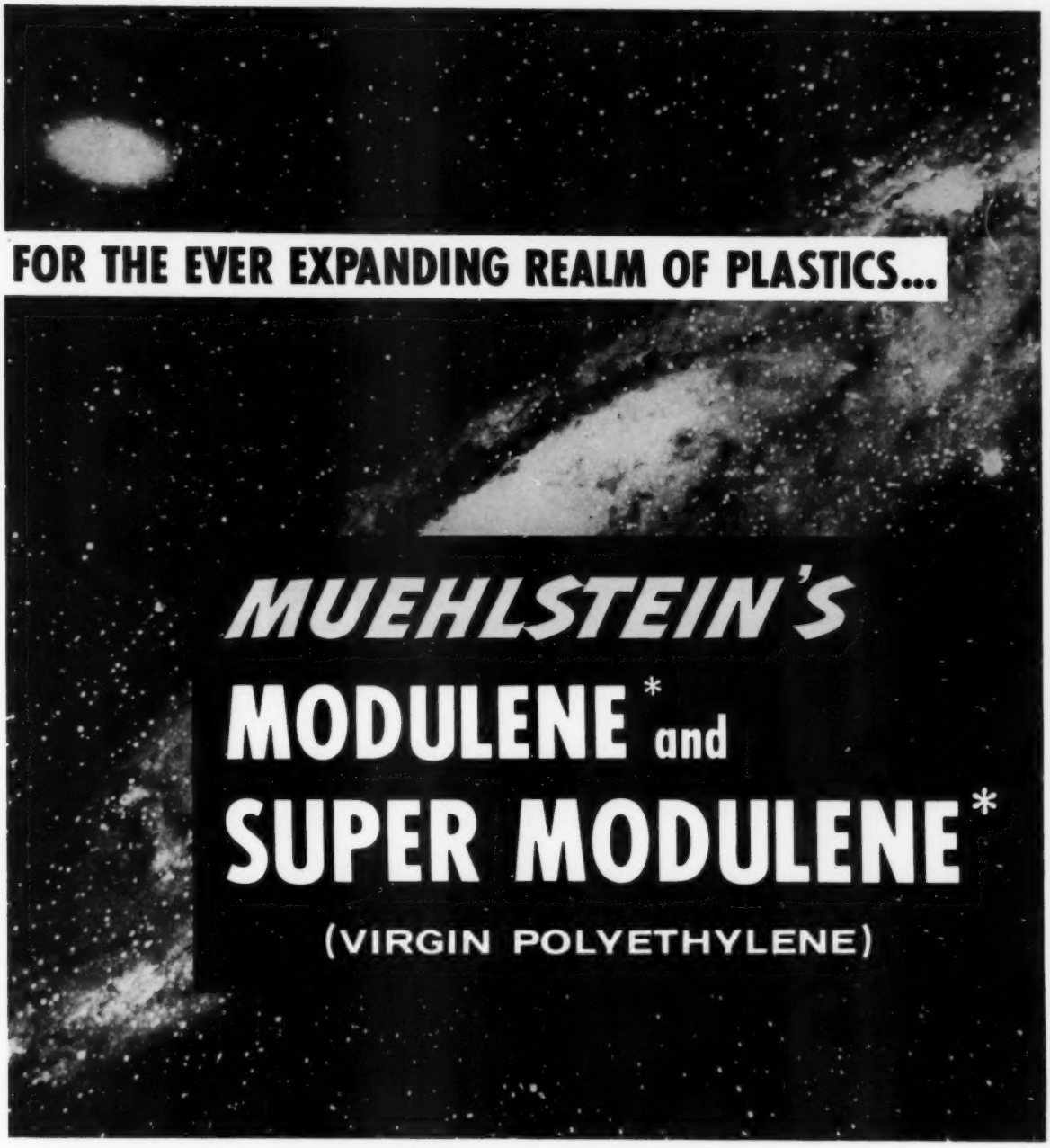

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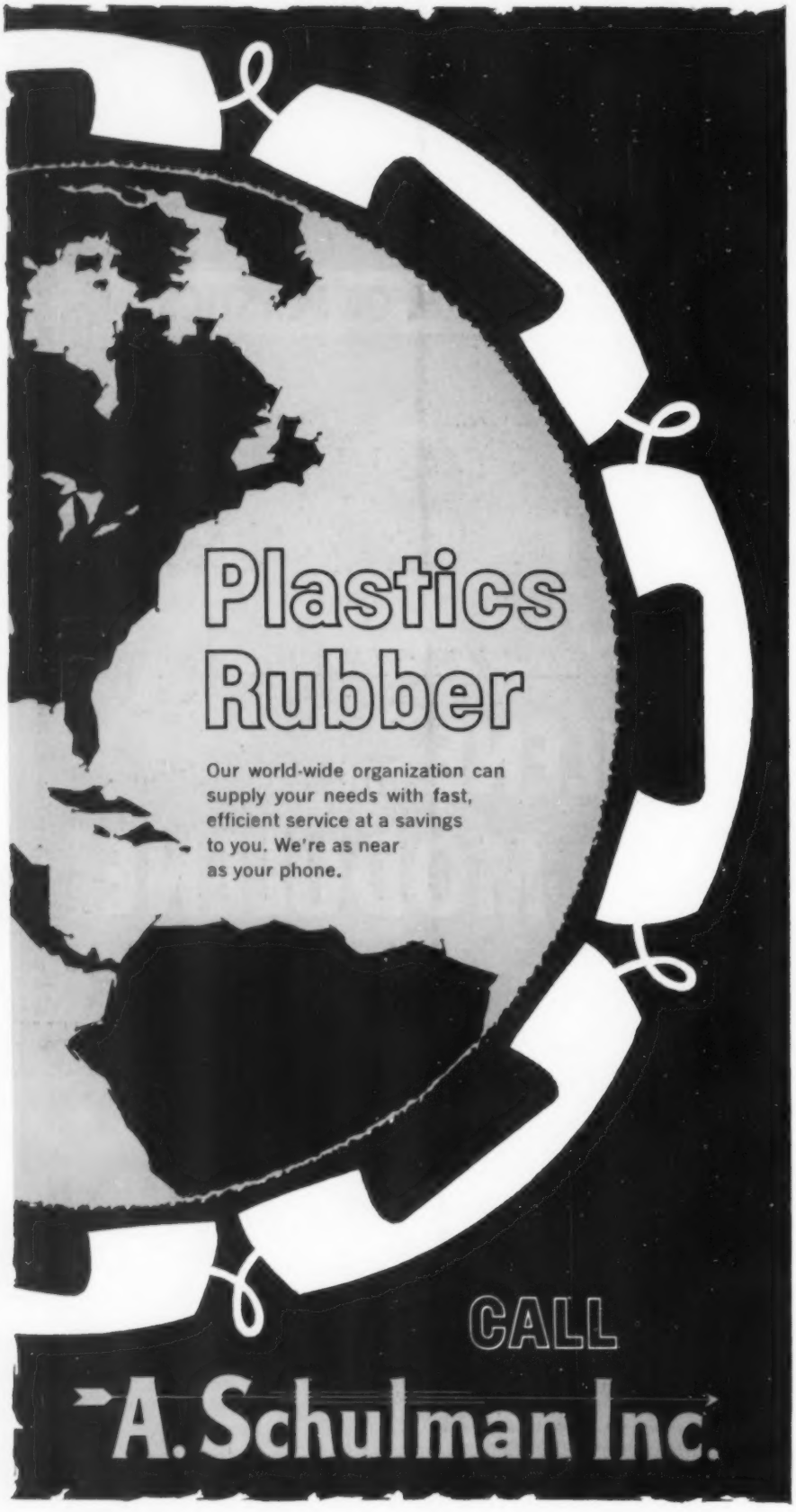
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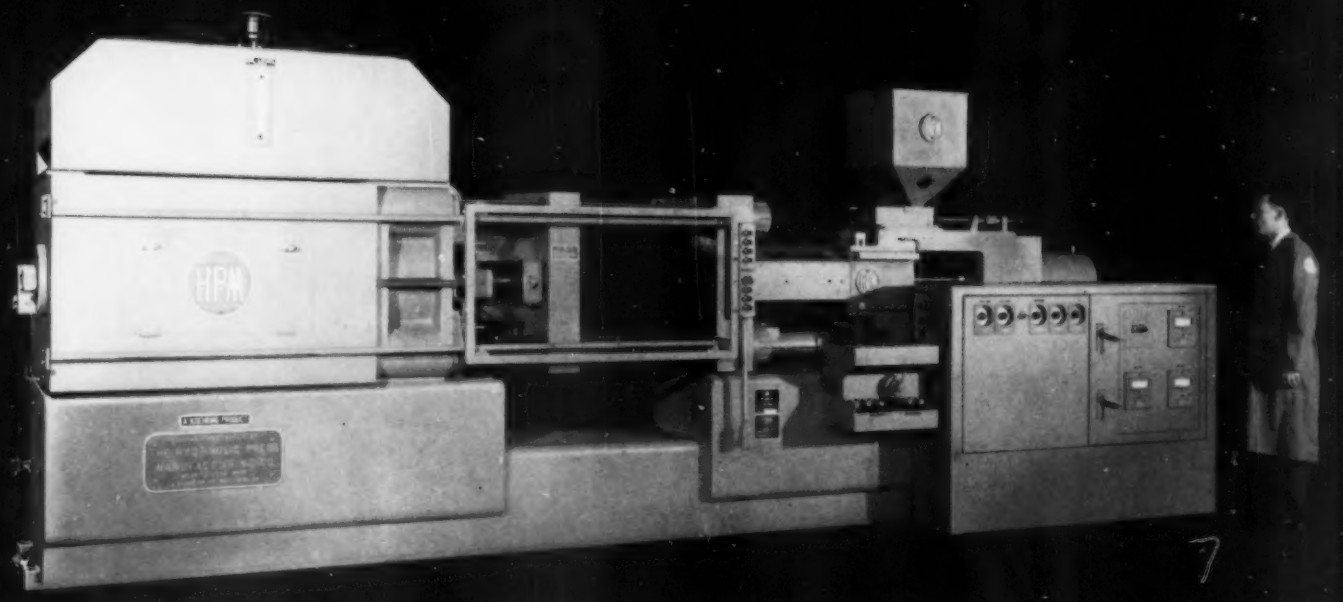
Our 30th Year



H-P-M Model 350-HV-12/16 Machine: Fast, Versatile; All New Design For Highest Production, Minimum Maintenance.

SPECIFICATIONS	200-H-6/8A	350-HV-12/16
Daylight (in.)	25	34
Daylight With Ejector Box Removed (in.)	29	52
Stroke (in.)	15	22
Clamp Tonnage	200	350
Platen Size (in.)	26x26	34x34
Mold Space (max.)	15x26	20x34
Plasticizing Capacity (lbs./hr.) (general purpose polystyrene)	90	150
Injection Rate (cu. in. per. min.)	675	1230
Electric Motor (HP)	30	60
Booster Power Units Available To Increase Injection Rate To (cu. in./min.)	1350	2110
Additional HP Required For Booster Power Units	20	30

H-P-M Model 200-H-6/8A Injection Machine: A Versatile High Speed Producer For A Wide Range Of Jobs.

A PAIR FOR COMPARISON

Here's a pair of *money-makers* in the wide open 2-oz. to 16 oz. range that will furnish that "one-two punch" *for any busy molding plant*. These exceptionally fast-cycling H-P-M injection machines have proven themselves in dozens of shops, producing up to 600 shots per hour — consistently. They will handle the big percentage of all molding jobs being run today. They're fast, dependable and easily maintained. Your H-P-M field engineer is looking for an opportunity to prove what these machines will do for you. Write or call today for complete information.

HPM

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THE HYDRAULIC PRESS MANUFACTURING COMPANY
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AMOCO CHEMICALS—A NEW RESOURCE

The "something more" we try to give each customer who buys our OXO ALCOHOLS

For more than three years we have been providing our customers for Oxo Alcohol with technical service on the use of our material. We work with them on their process difficulties. We endeavor to show customers how to accomplish savings on both processing and time by taking full advantage of the superior quality of our alcohols. The better and more consistent initial quality of AMOCO Oxo Alcohols results in crude esters that require less bleaching to meet color specifications. Also, less trouble is encountered with the re-use of unreacted alcohol.

The extremely low carbonyl content, excellent esterification color, acid color, and storage stability of AMOCO Oxo Alcohols has resulted in these products finding widening application in the manufacture of ester plasticizers. Manufacturers of didecyl phthalate plasticizers in particular are finding the "something more" in AMOCO Decyl Alcohol. DDP made from AMOCO Decyl Alcohol produces vinyl compounds with excellent mechanical properties. The superior permanence properties of AMOCO Decyl-derived DDP makes such plasticizers particularly suitable for vinyl compounds used in electrical applications.

Perhaps we may be of assistance to you. We will give your inquiry immediate attention.

AMOCO CHEMICALS

AMOCO CHEMICALS CORPORATION
910 South Michigan Ave., Chicago 80, Illinois

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PLENCO ELECTRICAL GRADE PHENOLIC COMPOUND

PLENCO 343 MICA PHENOLIC MOLDING COMPOUND

For Low-Loss Insulation Applications and Where Very Low Power-Factor is Required.

Available in STANDARD GRANULATIONS and also particle sizes best for AUTOMATIC MOLDING MACHINES; both granulations in

NATURAL, RED, and BLACK COLORS

Besides theoretical considerations in designing this compound, we have paid particular attention to such practical considerations as:

PREFORMABILITY. To obtain uniform density and subsequent uniform dielectric preheat.

LUBRICATION. To reduce mold-sticking and fouling without impairing electrical qualities.

RESIN CHARACTERISTICS. Relating to molecular weight-viscosity and set-time to provide dense, non-porous moldings absolutely essential for high standards of reliability.

Our technical staff is prepared to consult with you at any time about this electrical grade compound or any other molding material or problem.

Plenco 343 Mica Phenolic Compound is packed only in moisture-proof drums.

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plenco CAN PROVIDE IT...

already-made or specially-made

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FOR BETTER PLASTIC PRODUCTS

PLASTICS ENGINEERING COMPANY

Sheboygan, Wisconsin

Serving the plastics industry in the manufacture of high grade phenolic molding compounds, industrial resins and coating resins

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we deliver
the complete
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of equipment for

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BLOW MOLDING

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we are exhibiting

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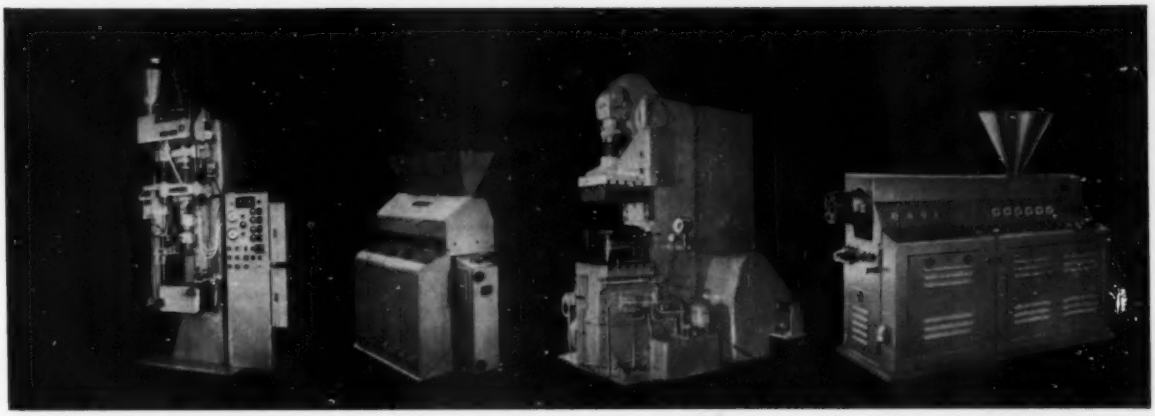

Blow Molding Machines
with piston and screw feed
up to 215 pts

Automatic Serial Presses
for screw caps etc.

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up to 300 tons capacity

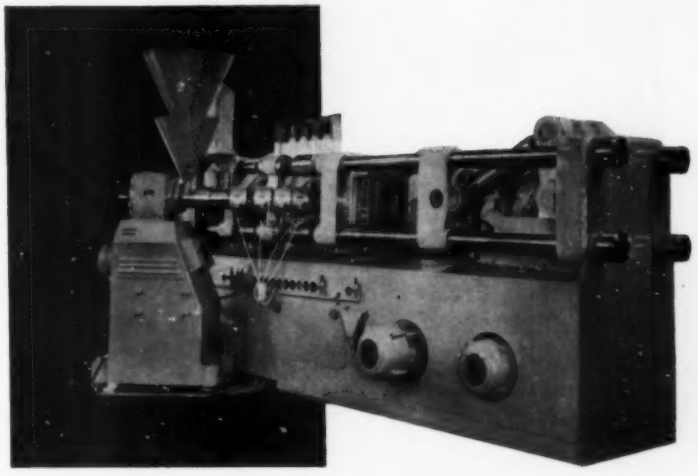
Extruders and complete Automatic Plants
(with screw diameters
1¼" 1¾" 2½" 3½" and 6" approx)

INJECTION MOLDING MACHINES

from 1/10 oz. upwards

with SCREW PLASTICIZING UNIT

from 1-350 ozs



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"There are many reasons why we chose Dake Plastics Presses to mold glass reinforced decorative panels for the home and building industry. But none is more important than those that mean savings in production time. Dake automatic controls reduce the human error factor . . . make it possible to train operators in a matter of hours to become push-button molding specialists."

—SAYS GENE SCHRAMM, PRESIDENT
TerraStone, Inc., Franklin Park, Illinois
(Suburb of Chicago)

A bank of three 50-ton capacity Dake Guided Platen Presses (above) used by TerraStone, Inc., Franklin Park, Illinois, to mold glass reinforced decorative panels.

JOB ENGINEERED TO MOLD REINFORCED PLASTICS

DAKE PRESSES

SPEED OUTPUT . . . REDUCE COST WITH THESE 7 FEATURES:

Guided Platen for accurate alignment.

Control can be automatic, semiautomatic, or manual.

Fast Ram Approach speeds closing of movable platen which slows automatically as work is approached.

Pressure Adjustable from ⅓ to full press capacity.

Electric Timer holds pressure during curing cycle—adjustable from 3 sec to 20 min—after which ram returns automatically.

Capacities from 25 to 600 tons.

Heated Platens can be provided.

Write for Bulletin 405, and tell us your special requirements.

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Gap Type Presses

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U.S.I. POLYETHYLENE NEWS

A series for plastics and packaging executives by the makers of PETROTHENE® polyethylene resins

JUNE, 1959 U.S. Industrial Chemicals Co., Division of National Distillers and Chemical Corporation 99 Park Ave., N. Y. 16, N. Y.

Packaging Notes

Polyethylene pouch in a carton is being used to package frozen berries and fruits packed in syrup or sugar. The heat-sealed pouch is made of polyethylene-coated paper. The polyethylene coating holds liquids inside the pouch even when fruit is thawed. A tear string is built into the pouch for easy opening. A carton and overwrap complete the package.

The new pack reportedly offers substantial savings in packaging costs and labeling versatility.

Heat sealable multiwall bag features staggered plies at the open end, leaving polyethylene-coated inner ply exposed for direct heat sealing. After sealing, adhesive is applied to the tops of the outer plies. The entire lip is folded over and pasted to the outside of the bag. The sealing machine then adds a strip of gummed tape across the lip. The new coated bags are said to be especially suitable for packaging hygroscopic, deliquescent, corrosive and semiliquid products.

New bag sealer closes open-end shipping sacks with a polyethylene-coated kraft paper tape. The machine caps a 2.5 inch wide tape over the open end of flat tube bags by means of heat and pressure. The molten polyethylene seals stitching perforations, making a tight, moisture-resistant seal. The sealer operates at production line speeds and is said to cut costs over conventional wax sealing. Taped bags are expected to be used soon for shipping a wide range of chemicals and fertilizer materials.

U.S.I. Appoints Two

Ralph M. Knight

William H. Rader

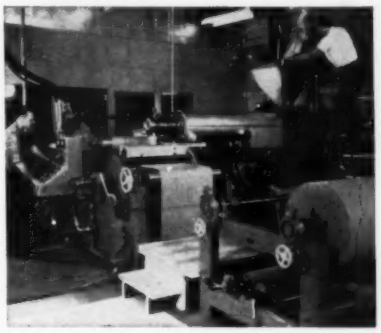
Ralph M. Knight has been named Manager of Polymer Planning and Applications by U.S.I. Mr. Knight will be responsible for planning and co-ordination of U.S.I.'s polymer development program. Mr. Knight previously has served U.S.I. in various polyethylene production capacities.

William H. Rader has been appointed PETROTHENE Polyethylene Production Manager. Mr. Rader has been Assistant Production Manager, and before that was in charge of polyethylene resin development programs at U.S.I.'s Tuscola plant.

Polyethylene-coated Milk Cartons Ready To Capture Volume

Leakproof Cartons Finding Favor with Retailers and Public

Polyethylene-coated milk containers are appearing on the market in selected areas and promise to take over a large share of the market now held by wax coated cartons. Although some machinery and production problems remain to be solved, the polyethylene-coated cartons have met with a favorable response with consumers and retail outlets.



The board coating machine above, located in U.S.I.'s Polymer Research Laboratory in Tuscola, runs at speeds equal to or greater than commercial equipment, duplicates the latter in everything but width.

Chief advantage of the polyethylene containers for both retailers and public is that the polyethylene cartons are virtually leakproof. Leakage of wax coated cartons has been a major problem. Polyethylene coatings not only provide stronger seals but also are more flexible at low temperatures and do not flake off as does wax. Polyethylene coated cartons are also scuff-resistant and may be printed easily.

Two Types Already on Market

Two types of containers are actually in use: a tetrahedron-shaped carton holding a pint or less, and a conventionally shaped full quart container. Initial use of the new polyethylene-coated milk cartons has been by dairies whose distribution systems involve rough or repeated handling that tends to damage conventional containers. New advances in container fabricating machinery, however, are expected to extend the use of polyethylene containers into major dairy markets.

Film Producer Offers Packaging Machinery Guide

A producer of polyethylene-coated films has issued a manual of automatic film packaging machinery available to users of polyethylene film packaging. The manual gives specifications for leading machines and describes such capabilities as speed, type of film that can be used, and package sizes each machine can handle.

The manual also contains conversion tables for calculating the yield of different film and paper combinations.

U.S.I. Opens New Sales Office in San Francisco

U.S.I. has established a new sales office in San Francisco to keep pace with the needs of customers in central and northern California and the Pacific Northwest. The address of the new office is: U. S. Industrial Chemicals Co., 220 Montgomery Street, San Francisco 4, California. The telephone is EXbrook 7-3250.

The new office will be tied into U.S.I.'s automated communications system through Pacific Coast headquarters in Los Angeles.

U.S.I. To Feature Cast Film At London Plastics Show

Cast polyethylene film will be demonstrated to the international market for the first time at the U.S.I. exhibit in the International Plastics Exhibition to be held in London, June 17-27.

Side-weld bags of ultra-clear PETROTHENE cast film will be made in the U.S.I. booth. Cast film was first introduced to the American market by U.S.I. last year.

In London, U.S.I. will also show packaging films made from PETROTHENE resins. A special feature of the exhibit will be a demonstration of how polyethylene garment bags are used by commercial dry cleaners to speed up customer identification of garments and to protect garments after they leave the cleaning establishment.

DO YOU HAVE a new polyethylene packaging development you'd like the industry to know about? Make it routine to send your information on new developments to U.S.I. POLYETHYLENE NEWS.

Address the Editor,
U.S.I. POLYETHYLENE NEWS, U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corp., 99 Park Avenue, New York 16, N.Y.

When you add brilliant printability to the clarity, toughness, and other well-known advantages of polyethylene, you can offer your customers a packaging material that will work as a powerful merchandising tool for their products. Polyethylene film can be economically printed with clear, bright colors at high speeds and with sharp registration and good ink adhesion. Packages can be formed on automatic machinery — sealed by heat-sealing or with adhesives.

Opens New Packaging Film Markets

With package designs that combine sparkling, multi-colored printing with polyethylene film's clarity, you can open up new packaging and merchandising opportunities for your customers. Printed film is now being used for dry-cleaner garment bags, produce packaging, soft goods overwrap, dairy and meat packaging, laundered shirt packaging, and many other applications where visibility, eye-catching color, and protection can be combined in a single package to give maximum sales appeal to the product.

In supplying film for this growing market, keep in mind the special advantages of U.S.I. PETROTHENE® polyethylene resins: excellent drawdown properties . . . superior toughness/clarity ratio in finished film . . . wide selection of resins ideally suited for clear or printed packaging film. Contact your nearest U.S.I. sales office for information.

U.S.I. is helping to expand your polyethylene film market with ads, similar to this one, addressed to the produce, food, dry-cleaning, and other package-using industries. These ads are designed to pre-sell your potential customers on the sales appeal and other advantages of polyethylene film packaging. To receive reprints of this advertising as it appears, write:

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corp.
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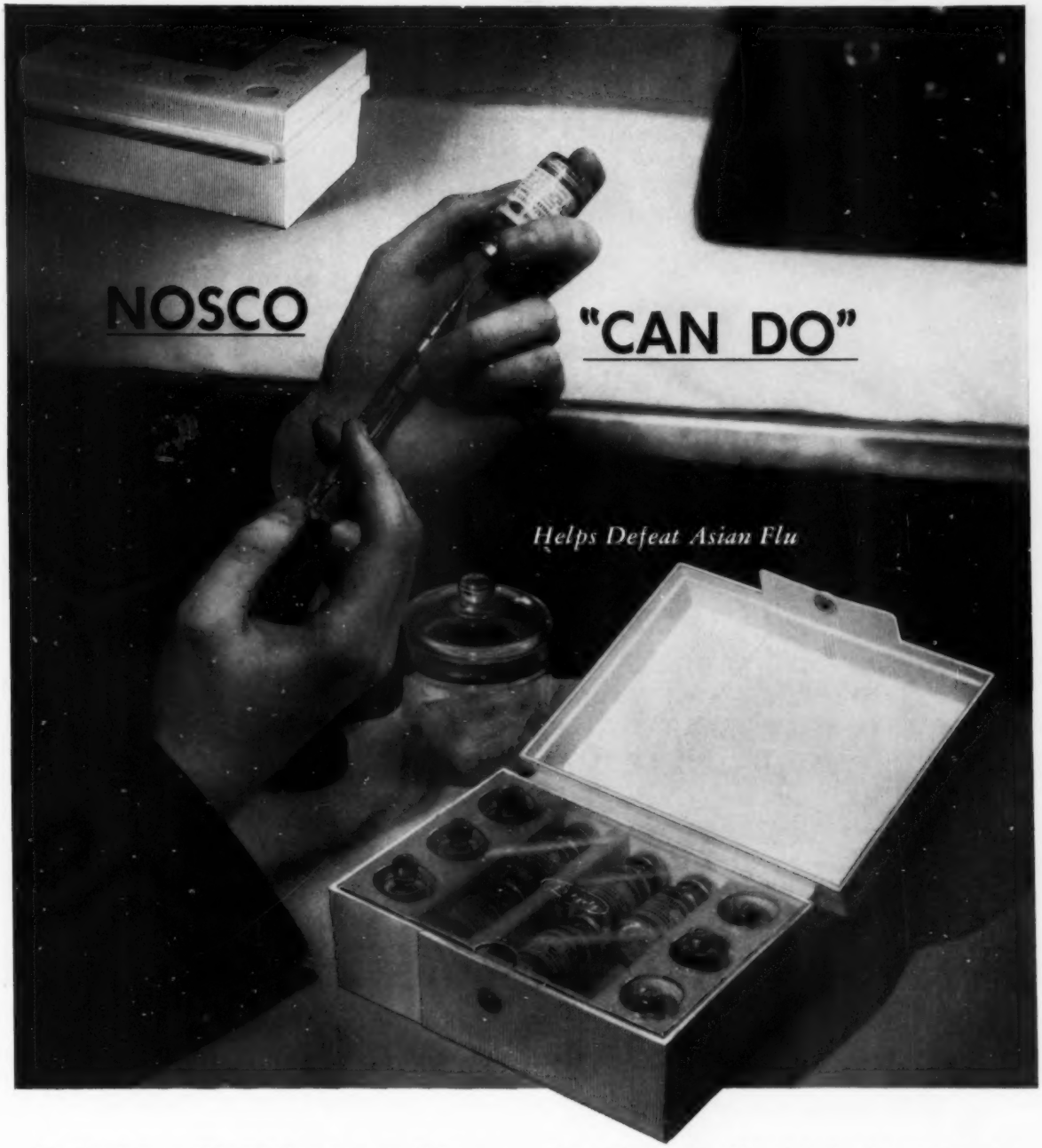

Yes, Nosco's famous "Can Do" ingenuity is contributing to a healthier America. Where doctors are fighting Asian Flu, you'll find this custom-molded Nosco Biological Kit by their side.

Lederle Laboratories wanted to make their precious flu vaccine easier for doctors to preserve and transport. They came to Nosco with their special requirements for a multi-vial carrying case. The container had to demonstrate striking clinical cleanliness and easy washability. Great shock resistance and chemical inertness were also necessary. And cost was important.

Nosco said "Can Do" and began transforming customer specifications into practical design. From flexible polyethylene they molded the container with an integral hinge for connecting the base and cover. A white expandable styrene liner was assembled into the base to give additional shock and thermal insulation. Further protection is provided for the vials by the clear acrylic panel, which hinges freely with the case by means of integral pivot lugs.

Nosco's finishing department hot stamped "BIOLOGICALS" into the cover and crimped male and female eyelet elements into the case. Finally, the assembled composite units were individually plastic-bagged to preserve the clinical quality.

Complex projects like this biological kit are routine at Nosco. In injection molding and decorating, Nosco "Can Do" is time tested. Let us show you how these skills can produce your plastic parts in volume and at reasonable costs. For more information, just write or call.

NOSCO plastics, inc. · erie 5, pa. *One of the world's great injection molders.*

OXO ALCOHOLS

To make vinyl for space-saving doors

Enjay Oxo Alcohols are a vital ingredient in plasticizers for the vinyl material used for space-saving folding doors and room dividers. Vinyl made with high quality petrochemicals is wrinkle-proof . . . provides years of service without cracking. Enjay Isooctyl, Decyl and Tridecyl Alcohols meet every requirement of high-grade plasticizers. They are uniformly high in quality and purity. Ask the manufacturers who insist on them. And insist on Enjay Oxo Alcohols yourself.

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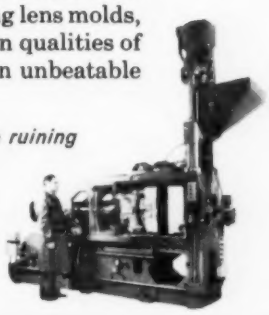
THESE LENSES RUN BEST ON OUR LESTERS!

no cloudy streaks...no milky films

Ray Lachapelle, Plant Manager, Plastic Division of American Optical Company in Southbridge, Mass. tells us:

"These viewer lenses are the finest injection molded acrylic lenses of their size produced anywhere in the United States—up to 3½" x 2½" and ranging in thickness from .750" to 1". We maintain rigid standards of clarity and quality and the machines on which we run these parts are our new 12-Ounce Lesters. Why? Well, first, we're running a full 4 ounces above the rated capacity of the machine. Second, the effective pressure of the machine produces bubble-free, sink-free parts with unsurpassed regularity. But to us the biggest advantage of the Lester is that internal contamination of the parts—cloudy streaks and milky films—has been practically eliminated.

"We're inclined to think that our technical know-how in building lens molds, combined with the proven qualities of the 12-Ounce Lester, is an unbeatable combination."



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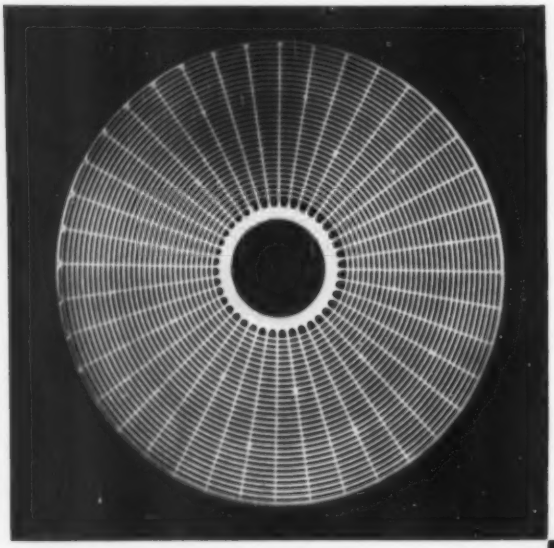
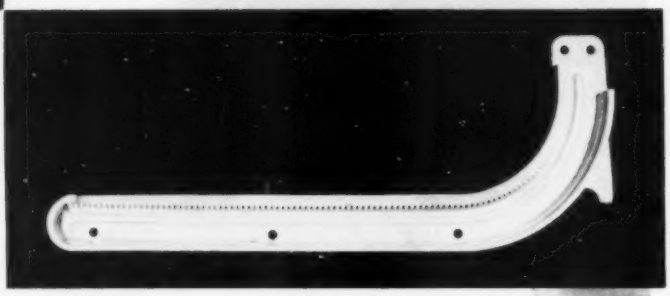
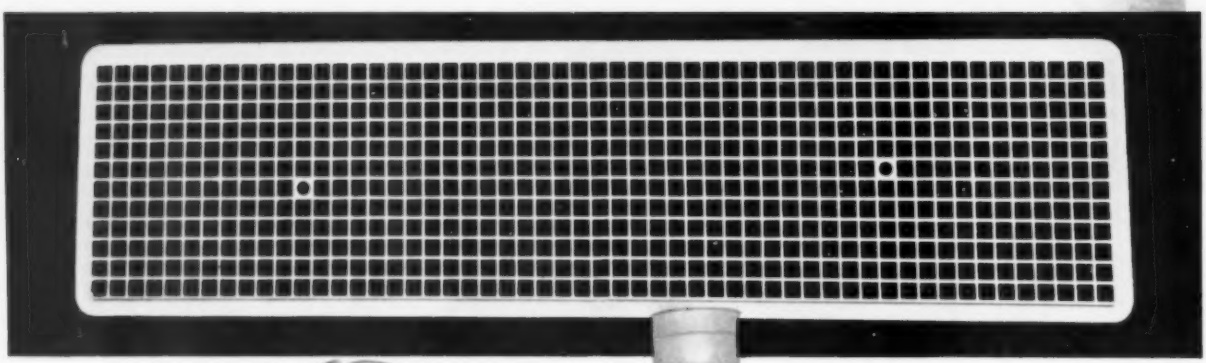
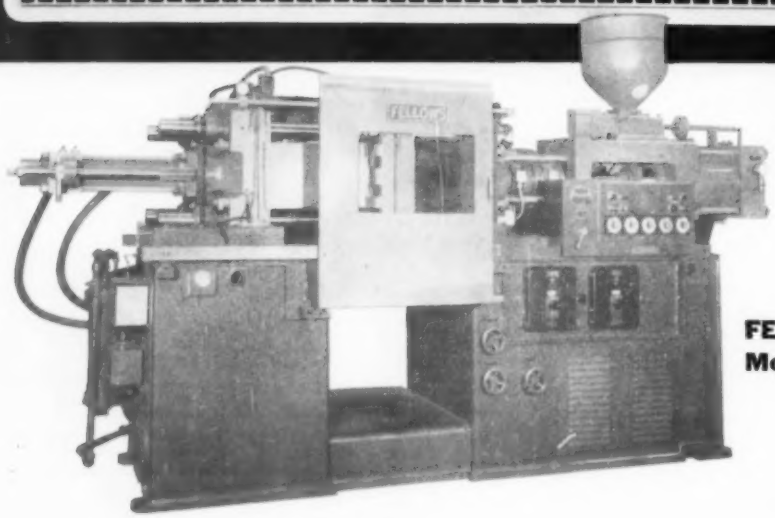


VENTILATING SYSTEM PART
$11\frac{3}{8}$" diameter
5.15 oz. Hi-impact Styrene
Production time: 30 seconds



LUGGAGE COMPARTMENT PART
$12\frac{15}{16}$" long
4.72 oz. Nylon
Production time: 90 seconds





VENTILATING SYSTEM PART
$25\frac{1}{4}$" x $6\frac{5}{16}$"
8.77 oz. Hi-impact Styrene
Production time: 28-30 seconds
(Including two pre-packs)

FELLOWS
Model 6-200

INTRICATE PARTS...

Fellows 6-200 Molds Lightweight Parts Economically for the New JET-AGE ELECTRA

Helping America's first commercial prop-jet airliner fly fast and high, these intricate plastic parts help keep cost and weight low in Lockheed's new 400-m.p.h. *Electra*. Difficult to mold on many other machines . . . but a standard Fellows 6-200 Injection Molding Press turns them out rapidly, accurately, and economically at Crescent Mold Engineering Corporation, North Hollywood, California.

On every sort of job, molders get faster cycling and easier operation with the versatile 6-200. The sensitivity and accuracy of Fellows' built-in controls speed set-ups and change-overs, provide safe, full-automatic operation. One man can operate three or more machines. Optional pre-pack device gives you up to *nine ounces* per shot, and dry run speeds range from 490 to 650 cycles per hour!

Find out how the versatility, accuracy and production speed of the Fellows 6-200 can lower *your* costs per piece. Ask your Fellows representative to give you the facts. (And ask him about the Fellows Plans for convenient short or long-term financing that lets you pay for your Fellows 6-200 while it produces for you.) Contact any Fellows office.

Fellows injection molding equipment

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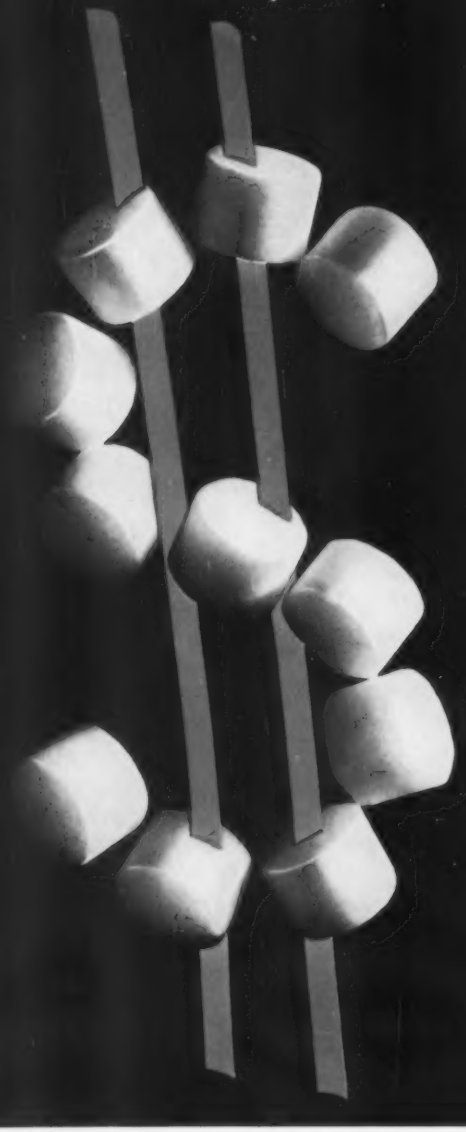
for you



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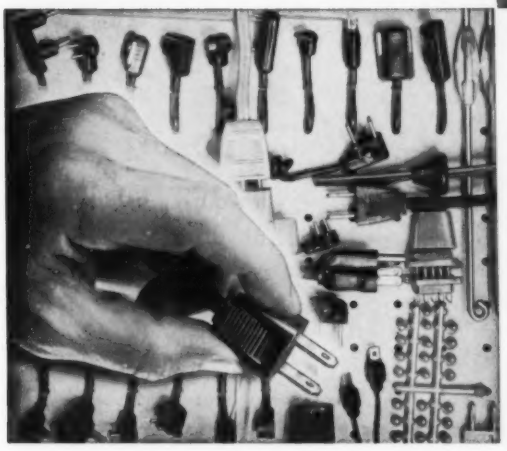

MINI-JECTOR cuts cost for manufacturers of electrical, electronic, industrial and commercial equipment. Wide variety (above right), all MINI-JECTOR produced, represents important savings over big press tooling where not required. All electrical and electronic parts (above) plugs, cord ends, antennas, miniature brush assemblies, slip rings, etc. (sub-miniature to 1½ oz.) made for less on MINI-JECTOR.

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For Less — Develop and produce molded items at fraction of big press tooling costs.

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Only MINI-JECTOR offers so many exclusive features:

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. . . for even short or moderate runs — too costly on big presses — profitable on MINI-JECTORS.

There's a MINI-JECTOR to fit your needs

From 9 stock MINI-JECTOR models and 50 combinations of stock options, you can select the machine to meet your exact requirements. MINI-JECTORS are offered with air or hydraulic power, with self-clamping "V" molds or conventional molds bolted to platens. Clamping may be horizontal or vertical. Operation may be lever controlled, semi-automatic or fully automatic.

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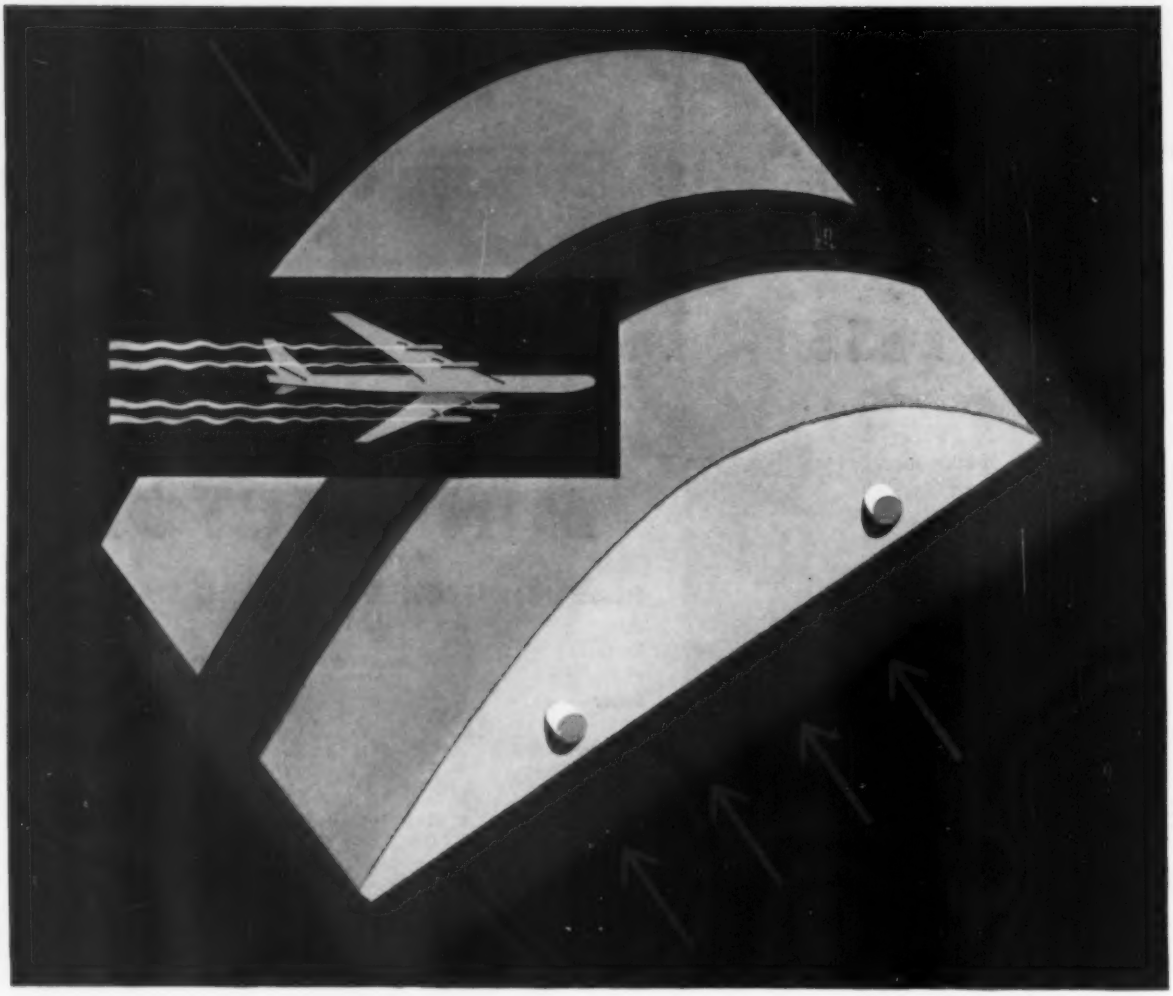
New, over 50 pages of detailed, illustrated, complete engineering data and specifications on all MINI-JECTOR models and accessories. *Contains complete price list.* Many money-saving exclusive features. Shows how MINI-JECTOR helps you develop and produce molded plastic items (sub-miniature to 1½ oz.) more profitably than by other methods. Mail coupon today!

Three of the nine popular stock MINI-JECTOR models Left, Super "Eldorado"; Center, "Wasp" bench model, Right, "Hornet".

For convenience, sign your name and clip to your firm's letterhead.



Save up to 30% in cost, 60% in time with **EPON® RESIN** tools and dies

Your tooling resin formulator will show you how Epon resin formulations save time and money in applications such as these:

High temperature tooling: Metal forming stretch dies that can operate at temperatures over 400°F.

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In addition, Epon resin formulations offer you the following advantages:

Excellent tolerance control: Little machining and handwork are required to finish Epon resin tools because of the material's excellent dimensional stability and lack of shrinkage.

Outstanding strength: Jigs and fixtures with thin cross sections can be built from Epon resin-based formulations reinforced with glass cloth. The resulting laminate has high flexural strength and excellent dimensional stability.

Easy modification: Tools and fixtures made from Epon resins may be quickly and easily modified to incorporate design changes.

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The combination of resin formulator's skill and practical knowledge, backed by Shell Chemical's technical research and experience, has solved many important tooling problems for industry. Your own formulator specialist can help you solve yours. For a list of experienced tooling resin formulators and additional technical information, write to:

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SHELL

THE PLASTISCOPE*

News and interpretations of the news — By R. L. Van Boskirk

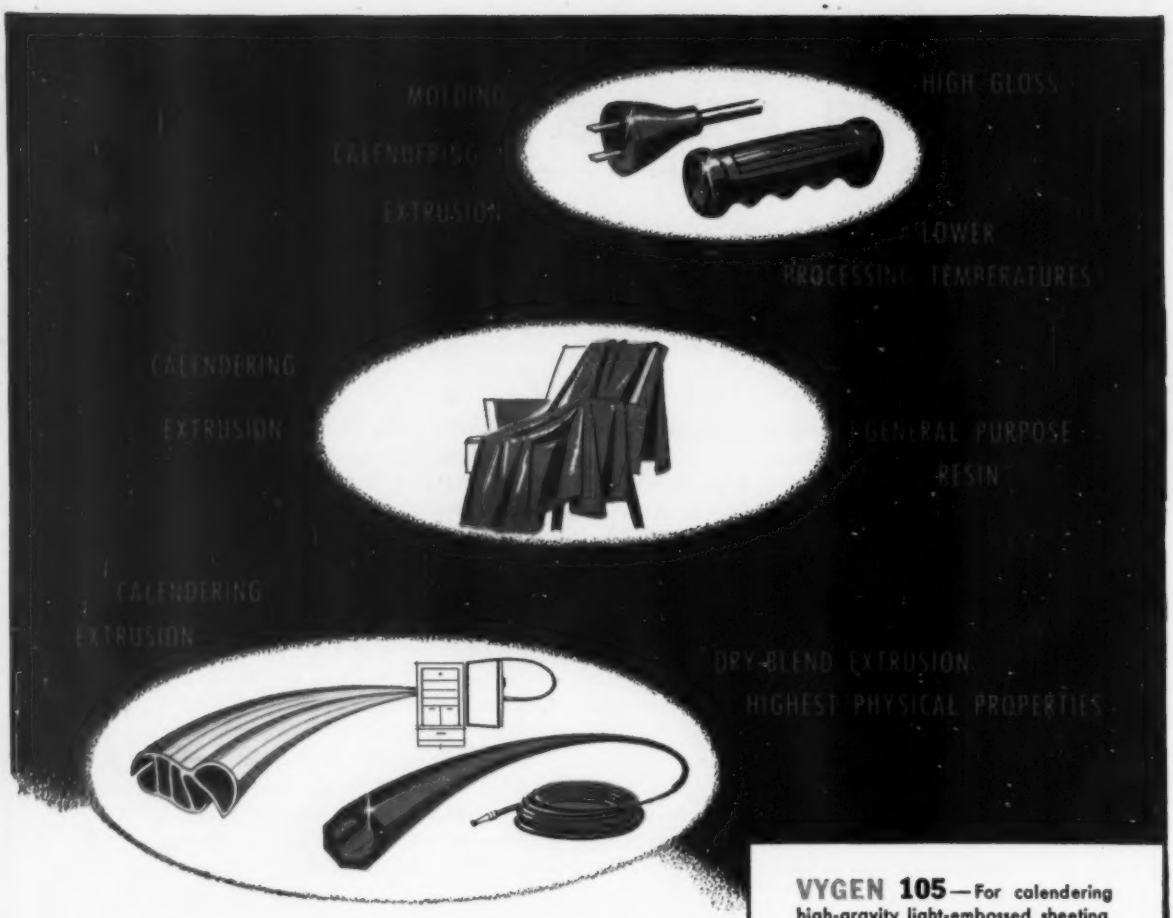
Section 1 — **June 1959**

What's going on in polypropylene. It is about 1½ years since Hercules Powder Co., Inc. announced commercial production of polypropylene with a capacity of 20 million lb. a year. It has now been stated by a Hercules official that this plant capacity would be increased to 50 million lb. and that a new 100 million lb. plant would be built at an unnamed site. Montecatini has announced production of polypropylene in Italy, but has as yet made no announcement of locating a plant in the United States. Import figures indicate that only a small amount has come in. Montecatini seems to be putting special emphasis on PP as a fiber and, in a copolymer with ethylene, as a potential low-cost rubber. New Jersey Standard (Humble Oil) has started construction of a 40-million-lb. plant in Texas, with plans reportedly made to enlarge to 100 million when it is needed. Sun Oil and American Viscose have combined to form AviSun, which will have a 20-million-lb. line in operation this fall and will build a 100-million-lb. plant on the eastern seaboard later. Announcements concerning new plants from several other companies are expected any day. Imperial Chemical Industries has also just announced it will build a plant to produce polypropylene in England under a Montecatini license.

What is PP being used for? Hercules polypropylene (Profax) really started to move early this Spring. Most new automobiles are now reported to have a polypropylene application, such as a dome light or an electric connector. The first item was a molded bed pan which has been followed by other hospital ware. Right now, all these items are in production: A vaporizer housing; the top and handle of a Cory coffee pot; a Lazy Susan; a pot scraper; a ball point pen ink cartridge; closures with a crimped decorative effect for cosmetics; dinnerware; a field telephone case for the Signal Corps that was specially molded in thick sections to withstand a —60° F. test; pipe fittings and valves; spray containers for insecticides; decorative combs and an eyeglass case with a built-in hinge. Seiberling Rubber Co. reports that its ⅜- to ½-in. polypropylene sheet has been used for six months without deterioration as a basket to hold items for electroplating and will withstand up to 300° F. Rope from filament has been an important item ever since the price of polypropylene was reduced and ultraviolet light resistance was built up. It is lightweight, doesn't creep, permits no water penetration, and can be handled in frigid weather. Fiber for auto seat covers and outdoor furniture webbing is in production—its resilience eliminates sagging.

Other possibilities now under way are fan blades, small aerosol bottles, an instrument cluster board for automobiles where resilience, fast flow, and no distortion are important. Molding was reportedly slowed up until processors learned how to allow for shrinkage, but once the amount is established the molder can then depend upon consistency—which doesn't seem to be true of all polyolefins. Hercules asserts that the much-discussed low-temperature brittleness of polypropylene can be overcome (To page 39)

Reg. U.S. Pat. Off.



There's a specialized VYGEN® resin for every application

With the development of these specialized vinyl resins, General's Chemical Division is prepared to put the *right* PVC resin to work for you. All three have good heat and light stability, high-bulk density, very good clarity and exceptional uniformity. For technical assistance and detailed information on the VYGEN resin for *your* operation, just drop us a line on your company letterhead. We'll be glad to work with you on that "tough" problem.

VYGEN 105—For calendering high-gravity light-embossed sheeting, and for molded items and extrusions requiring a high-gloss finish. This resin can be processed alone or with other resins, permitting lower processing temperatures.

VYGEN 110—A general purpose, average molecular weight resin, especially adapted for easy processing of calendered film, sheeting and coated fabrics . . . also recommended for certain molding and extruding applications.

VYGEN 120—A high molecular weight resin ideally suited to dry-blend extrusion operations with monomeric or polymeric plasticizers . . . excellent, too, for calendering when maximum physical properties are desired.

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THE PLASTISCOPE

(Continued from page 37)

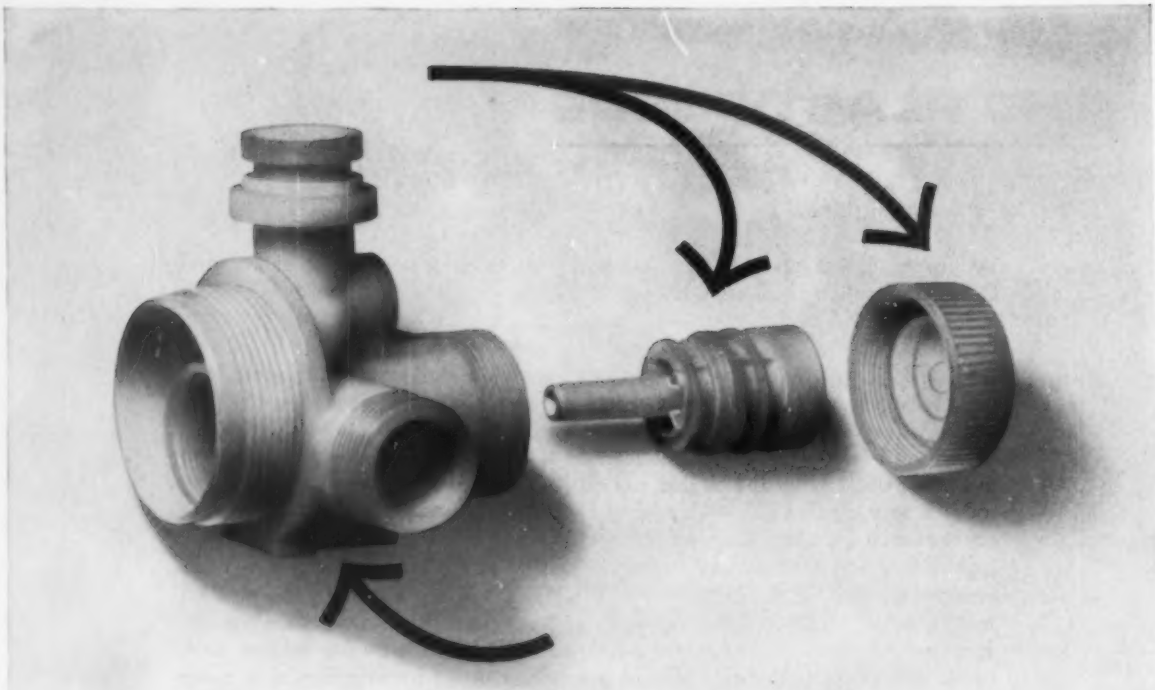
by proper design and molding, especially of thick sections, like the Signal Corps application mentioned above.

Polypropylene for film. Film production has been slow developing but now looks most encouraging. A film producer was running it on a flat wrapping machine the last day of the Packaging Show, even though he had troubles before. It hasn't yet been successfully produced on tubular film machines but has been handled primarily by the chilled roll or quenched process. The future for film may be in very thin gages—less than a mil may even do the work of 1½ mil conventional PE film. Thus an 0.8-mil PP film with a density of 0.900 made from a 44¢ PP resin is said to be 20% less costly than a heavier density and thicker polyolefin and could run faster because of greater stiffness. A 1-mil PP film at 89¢ could supposedly compete with a 1.4-density cellophane at around 60 cents. However, polypropylene film is not yet a big volume item, and a definite waiting period seems inevitable until further progress is made in producing and marketing.

Plastics in 1965. The future for various plastics materials was forecast by Arnold F. Sward, Market Research Manager for Union Carbide Plastics Co., at the May meeting of the Chemical Market Research Association in New York City. Mr. Sward based his predictions on U. S. Tariff Commission reports and projections therefrom. Among his forecasts were the following: Cellulosics—172 million lb. in 1956. Styrene resins of all types from 695 million in 1958 to 860 million in 1965. Phenolics—from 461 million in 1958 to 600 million in 1965. Urea resins from 324 in 1958 to 440 million in 1965. Polyesters from 114 in 1958 to 230 in 1965, but with a caution that this total could be much, much higher if polyester-fibrous glass laminates catch on in the building field. Polyolefins were defined as all types of PE and their copolymers, exclusive of polypropylene. This field may grow from 864 million in 1958 to as high as 2.15 billion in 1965, he said. He also pointed out that low-pressure, high-density PE had grown from 8 million lb. in 1957 to over 43 million in '58, and would be 50 million in 1959, which he reported as the fastest rate of growth ever attained by a plastic material during this three year period. In the vinyl group, which includes vinylidene chloride, butyral, acetate, etc., as well as vinyl chloride, he listed a figure of 821 million in 1958 and 1.4 billion in 1965. He made no attempt to separate vinyl chloride from the other types of vinyl resins.

Mr. Sward forecast that 1965 production of all plastics could be 8 billion lb. and over 11 billion in 1970, but stated that the figure could be much larger if technical developments should lower costs of raw material and if plastics applications for heavy construction prove successful.

Plastics in 1959. Forecasts for plastics consumption in 1965 given above will indeed be conservative if measured by what happened in the first quarter of this year. January and February consumption was generally better than any month in 1958, but March (last month for which Tariff Commission figures are available) was so good that it makes a man scratch his head and wonder just what's going on anyhow. **(To page 41)**



Chicago Molded parts improve performance, cut costs 3 ways

These molded nylon parts compose a unique Venturi valve unit used to regenerate the mineral bed of the Culligan Automatic Water Softener. Previous valve bodies were brass. By switching to injection molded thermoplastics, performance and durability were improved . . . material cost cut, machining and finishing eliminated. To function properly, exacting tolerances were vital. And the valve's $\frac{3}{8}$" diameter outlet had to be formed without parting lines—inside and out. Any irregularity would harm the Venturi system vacuum. We had the answer, and production capacity to mass produce the parts as specified. *Your job* may be smaller or very large . . . may require a different plastic . . . compression or transfer molding. Our forty years of custom molding know-how and a complete range of press facilities can come up with *your* right answer—can recommend the material and method of utmost value to you. Call or write . . . no obligation.

CHICAGO MOLDED
PRODUCTS CORPORATION
1021 North Kolmar Avenue, Chicago 51, Illinois

THE PLASTISCOPE

(Continued from page 39)

The three leading-volume plastics were racing along at such a pace as to make even a wooden horse on a merry-go-round grow dizzy. Polyethylene consumption was over 91 million lb. or about a 1.1 billion lb. annual rate, and, since production was over 95 million lb., this must mean that high-pressure capacity has been underestimated or that low-pressure material is selling better than earlier Tariff Commission figures indicated. PE film consumed over 31 million lb., a 372 million lb. annual rate, which is well over 100 million lb. more than was estimated in 1958, although it could be that some export material is still reported in this classification.

Vinyl chloride sales were reported at 70 million lb. or approaching an 850 million lb. annual rate compared to 750 in 1958, and there is no indication of a serious drop as yet. Styrene type molding materials of all categories reached a 47 million lb. figure or a 564 million lb. annual rate, compared to 450 million in 1958. Did someone say that polystyrene was in for a decline? But just the same it is difficult to find where all that molding material is being used. More than one producer is curious but happy anyhow.

Another real good figure was 18 million lb. of phenolic molding material—any time the figure goes that high both producer and molder are happy—it's not a record but it's a heart-warmer after those miserable less-than-15 million lb. months in 1958. Practically all other plastics showed large percentage gains during this period, which were considerably above the government index for all manufacturing.

New polyethylene copolymer molding compound. Something new in a PE copolymer for molding, named DPD-7365, is the first of a new series of molding materials announced by Union Carbide Plastics Co. It was developed especially for housewares but is expected to find uses in other applications.

The new copolymer has outstanding low temperature properties. Garbage cans are said to show no damage after crushing by a 16-ton truck at 10° F. and at —10° F. The cans withstood 6-ft. dropping tests. Other qualities claimed are flex life five times longer than existing PE molding materials of similar flow, superior stress cracking resistance, good surface gloss, easy molding, high rigidity.

Union Carbide officials have not disclosed the second monomer in this combination, but talk in the trade is that it is an acrylate, a material which U. C. produces and has long promoted as a chemical with outstanding copolymerization possibilities.

Expansion in Mylar facilities. A second plant for production of Mylar polyester film has been announced by Du Pont. The new $20 million plant will be located near Florence, S. C., with completion scheduled for early 1961. Production of Mylar started at Circleville, Ohio in July 1954. It was soon expanded by an unannounced amount, and a 30% expansion of that total will be completed in early 1960. On completion, the Florence plant is expected to almost double the Circleville operation.

Chief outlet for Mylar is electrical tape and slot liners, where it has made possible the use of smaller cable and smaller stators on motors. Another large use is for metallic yarn, which makes it **(To page 43)**

Lily white, carnation pink and all the beautiful light colors of nature's flowers . . . gradations of light to dark yellows and greens in stems and leaves . . . the translucency of membranous structures . . . these are all reproduced in plastics with the

Your choice in white pigments reflects her choice in flowers

aid of titanium dioxide white pigments. And accompanying these are textures and surfaces that seem to be nature's own. To all these things, TITANOX* titanium dioxide white pigments contribute, through uniformity of brightening, whitening and opacifying power and ease of dispersion into plastic masses and coatings too.

Whether the end product be plants or flowers, toys, gloves, tires, soles or anything involving polymers that need white pigmentation, your choice of TITANOX pigments will be right. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities.

TITANIUM PIGMENT CORPORATION
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*TITANOX is a registered trademark for the full line of titanium pigments offered by Titanium Pigment Corporation.

6708

THE PLASTISCOPE

(Continued from page 41)

possible to process the coated material at a boil. Magnetic recording tapes of Mylar are used for television tape recording and other purposes. It is widely used as a laminate to fabric or vinyl for decorative purposes, or to wood, paper, metal, etc., to provide an abrasion-resistant surface. A weatherable form is now being used for greenhouses. A spectacular use is "boil-in-the-bag" frozen food uses.

None of these markets is anywhere near saturated. The present price ranges from $1.80 to $3.90/lb. Five price reductions have been made since the start of production, but Du Pont warns that speculation concerning an eventual price decline to equal that of cellophane is unwarranted.

PVC-polyethylene mixture. A recent press release from Germany concerning the Plastics Trade Fair in Düsseldorf next Oct. 17 to 25 induced a series of questions to this office concerning the mention of a mixture of PVC and chlorinated polyethylene, which would be on exhibit at the Fair. This material is certainly not unknown in the United States. Several producers are in various stages of development, but so far as is known no one has yet offered it to the trade and probably will not for some time to come.

In laboratory tests this PVC-chlorinated PE exhibits remarkable properties with an especially wide range of characteristics. For example it is claimed that it can be used at temperatures from —40 to 85° C., a much greater range than is claimed for plasticized PVC. Furthermore it is reportedly possible to formulate such a material so that it will be either hard and highly impact resistant or soft and flexible. Finally, the material is said to have the good dielectric properties of hard PVC but in a flexible form.

Progress in crosslinked polyethylene. Godfrey L. Cabot, Inc. reports increased interest in the use of crosslinkable polyethylene compounds, to which they give the tradename CAB-XL.

The most immediate application for these compounds is as insulation on wire and cable. Such insulation gives improved abrasion resistance, weather resistance, and temperature resistance over conventional polyethylene. These electrical compounds contain 40 to 50% by weight of thermal black costing only 4¢/lb. The crosslinking agent most widely used is DiCup (dicumyl peroxide) produced by Hercules Powder Co.

CAB-XL pipe containing as much as 75% carbon black by weight can be extruded and continuously crosslinked. The present extrusion rate appears to be slower than that of polyethylene but faster than that of unplasticized PVC.

Advantages of crosslinked polyethylene are that it is practically insoluble, is non-corrosive, and creeps very little under stress. It will not melt under any temperature, although strength is somewhat lowered at high levels. The insolubility of CAB-XL makes it as difficult as polyethylene to cement. This difficulty has hampered the development of simple fittings for CAB-XL pipe.

For additional and more detailed news see Section 2, starting on p. 216

LETTERS TO MODERN PLASTICS

Where readers may voice their opinions on any phase of the plastics industries. The editors take no responsibility for opinions expressed.

Powder, not paste

We would like to point out that new Silvex aluminum pigments, described in your March 1959, Plastiscope Section (p. 200), are not aluminum pastes, but are actually dustless powdered aluminum flakes coated to eliminate explosion hazard from dusting.

The manufacture of aluminum paste dispersions using plasticizers such as DOP and TCP is not new. We have been doing it ourselves for years. The introduction of our Silvex dustless aluminum powders, however, is new and unique. They open the door to the use of aluminum pigments in phases of the plastics industry which previously found aluminum powders too hazardous, or too much of a nuisance.

These dustless aluminum powders have the appearance and flow characteristics of a dry powder, and may be handled as such in processing. In their preparation, each flake is enveloped in a thin film of DOP, TCP, or mineral oil. Other plasticizers or liquids may also be used on special orders.

The outstanding feature of Silvex dustless powders is the elimination of hazards from explosion, fire, or contamination of the surrounding area because of the dust normally associated with ordinary aluminum powders.

The very small percentage of dampening agent used in these dustless powders, in most instances, is not sufficient to interfere with the properties of the finished plastic-molding compound, vinyl, etc.

Further correcting your March article, Silvex dustless aluminum powder is not at present offered in Cycolac ABS, but is under study for future use. The material is, however, currently being used in Kralastic production.

Ernest Scheller, Jr.
Vice President
Silberline Mfg. Co., Inc.
Stamford, Conn.

PE to the rescue

In the hope that I may be helpful to some other small producer who is battling the packaging problem, as I have been doing for the past 10 years I offer as follows.

Our products are unprotected silver nitrate points. They must be kept from lightrays and air. A colored plastic container would be of prohibitive cost.

Recently we located a fabricator of very unusual paper tubes, of bright colors and neat, compact design. BUT—they were not moistureproof.

Then we learned that a well-known producer of plastics has made its leading item in LIQUID form, so that it could be sprayed.

That did it! The paper tube outfit has provided us with a lightweight, attractive, moistureproof container, with our label printed in bright color. And they are low in cost.

The polyethylene is from Spencer Chemical Co.; paper tubes from Niemand Bros., Inc., Elmhurst, N. Y.

William P. Babcock, Mgr.
Tappen Zee Surgical Co.
Bayville, N. J.

It does, so, conduct

This is in reference to an article appearing on page 39 of the May issue of Modern Plastics. This article concerns a conductive vinyl compound developed by the Abbey Plastics Corp.

It would seem that there is some misconception by your writer as to what this conductive compound is and does.

A particular case in point is that your article states that this compound does not carry current. Yet it is being used as an ignition system for gasoline engines where it is carrying anywhere from 14,000 to 30,000 volts. There are many other instances where electrical and electronics engineers have devised constructions using this compound as a current carrier. The material has a low resistance of 8 ohms per centimeter cubed, which is considerably lower than the resistivity figure for so called semi-conductors.

A. C. Murphy, Vice-Pres.
Abbey Plastics Corp.
Hudson, Mass.

Too many papers?

I would like to comment upon your recent editorial "Too Many Papers." You are quite right in the fact that recent SPI and SPE meetings have poured out considerable quantities of papers that are a rehash of previous published literature. And I quite agree with you that this is not a healthy situation. Emphasis should always be placed on new materials and new ideas that will benefit the plastics industry.

Perhaps the correct answer to this problem lies in the fact that in every technical meeting there should be two classes of papers: Type 1 contains old information which may involve description of prior art and might still continue to be presented for the edification of new people and new companies continually entering the plastics field. Type 2 should be clearly indicated as information new in concept and in origin, introducing the newer trends in the plastics industry.

I mention this fact because, while we who have been in the industry for a long time may tend to abhor the "rehashed" papers, we cannot overlook the fact that there is a small segment of individuals looking for an education. However, their intentions should be clearly identified so that attendance at the meetings may be distributed between those interested in an education and those seeking new ideas.

John Delmonte, Pres.
Furane Plastics, Inc.
Los Angeles, Calif.

New slant on deep freeze

Just as there is more than one way to skin the proverbial cat, so there is more than one way to build an insulated portable food freezer (see "For portable refrigerators, molded styrene foam takes over from metal," MPt., May 1958, p. 93).

Our customer, Polar Bar, Inc. of Athens, Ga., has been manufacturing attractive, durable, and completely portable food freezers from RCI's Polylite resin for several years. In operation these freezers stay at —20° F. regardless of surrounding temperature. Low power cost is achieved because the reinforced plastic acts as an insulator, and combined with standard insulating materials, keeps ambient heat out of the interior of the box.

We have alerted Polar Bar, Inc. to the possible use of foam insulation in conjunction with reinforced plastic construction, and they are investigating this possibility.

John Rothschild
Technical Editor
Reichhold Chemicals, Inc.
White Plains, N.Y.—**End**

Why settle for less-than-perfect blending? when you can put CONTROLLED DISPERSION to work for less than $1500.00*

If you combine resins such as vinyls, cellulosics, styrenes, polyesters, polyolefins, etc., with colorants, plasticizers and fillers . . . why settle for less than *complete* dispersion? An investment of only $1475.00 in this ¾ cu. ft. *intensive* mixer may show you how to save four times that much in waste and rejects due to laminations and imperfections.

DESIGNED FOR DISPERSION

If you're coating a fine dry material, blending liquids into a dry powder or dispersing a small amount of one material into a large amount of carrier, you've got a job that takes *more* than a stirring or tumbling action can *give*. Mix-Muller is specifically designed to put you in *control* of these blending properties.

A SPATULATE ACTION

In the Simpson Mix-Muller you get a unique three-way kneading, smearing, spatulate action which actually coats one material with the other . . . rather than placing them *next* to each other. You get an intensive *controlled* dispersion and a homogenous mix that stays mixed in storage or transit.

CONSTRUCTION

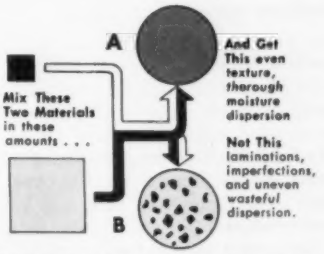
Spring-loaded mullers permit exact adjustment of pressure to meet material requirements. Dust cover can be quickly adapted for exhaust. Automatic bottom discharge is fast, clean, positive. Unit can be equipped for heating or cooling.

WRITE for a quotation on the LF Mix-Muller, details on a confidential mulling test on your product—or a bulletin describing the *full* line of Simpson Mix-Mullers. They are available in batch capacities of ¾ to 60 cu. ft.

- Unit, ready to go, as above, FOB Chicago $1475.00*
- Same with #302 or 304 stainless steel pan and all interior mixing components FOB Chicago $2850.00*

Prices quoted are for domestic shipment only.

Model "LF" Mix-Muller has capacity of ¼ to ¾ cu. ft. Comes equipped with 1 HP motor and starter, V-belt drive, removable dust hood, crib and muller scrapers, liquid additions funnel, integral base for bench mounting and 4 pipe legs for floor mount. No foundations necessary. Has machined crib and mullers; discharge is automatic, by bottom door.


A
B
Mix These Two Materials in these amounts . . .
And Get This even texture, thorough moisture dispersion
Not This laminations, imperfections, and uneven wasteful dispersion.

Here's how *controlled mulling* works:

Diagram shows comparative results of blending a minute amount of one material with large amount of another material in (A) MIX-MULLER and (B) conventional mixer. Savings in raw material, reprocessing time and quality of finished product are the outstanding *rewards* of mulling your product.

SEE OUR ADVERTISEMENT PAGES 1263-1266 CHEMICAL ENGINEERING CATALOG *FOR MORE DETAILS*

SIMPSON *MIX-MULLER*® DIVISION

National Engineering Company
662 Machinery Hall Building • Chicago, Illinois

P-255-H

HOW MULLING gives you controlled dispersion for better blends:

GOING: Mix is wetted, dispersion of coating media begins as lumps form.

GOING: Smearing, *spatulate* action breaks up lumps as mulling action disperses moisture.

GONE: Agglomerates almost gone as blending nears completion. Mix is homogeneous, thorough.

NEW MACHINERY-EQUIPMENT

Specifications, claims made, and prices appearing in these pages are those of the manufacturers or sellers of the machinery and equipment described, or their agents.*

High-speed 12/16-oz. molder

The Lombard Model 3220-125 injection molding machine shoots a normal shot of 12 oz., up to 16 oz. with stuffing arrangement. Plasticating capacity is 150 lb./hr., injection rate is 24 cu.in./sec. during injection, dry cycle time is 5.1 sec. with the full 12-in. injection stroke. Top injection pressure is 20,000 p.s.i.

Clamping capacity is 325 tons, stroke is adjustable from 8.5 to 20 in., accommodating dies from 8 to 22 in. deep, and up to 20 in. high and 36 in. wide.

The dual-pump system is powered by a 50-hp. motor and delivers 62 g.p.m. against the full line pressure of 2000 p.s.i.

The heating cylinder capacity is 25.5 kw. over three zones. Instrumentation for this molder includes: three py .meters, four timers and one stuffing counter, five-point safety-interlock system, and automatic compensating weigh feeder. *Lombard Governor Corp., Ashland, Mass.*

Medium injection machine

The Fellows No. 6-10-225 injection machine shoots 6 oz. straight or up to 10 oz. with prepacking. With the standard 20-hp. motor and 45-g.p.m. pump, it dry cycles in from 3.9 to 4.4 sec., depending on stroke length, which ranges from 8 to 14 inches. Mold bases up to 15 by 25 in. can be accommodated.

Plasticating capacity is 100 lb./hr. of GP polystyrene at 420° F. Nozzle and cylinder are joined by new ball-joint adapter, which facilitates alignment of sprue bushing and heating cylinder. Controllers are provided for cylinder and nozzle heaters. The toggle-type, hydraulically operated clamp develops a locking force of 225 tons, has movable die plate and 4-in. ejection knockout plate. All vital bearing points are automatically lubricated.

The standard control circuit requires operator to open and close door, but optional kit converts to fully automatic. Other optional features include: multiple nozzles, with or without sequential valving (see "Sequential impact molding," MPL, Nov. 1958, p. 187); power take-off for actuating core pullers or unscrewers; various stroke interruptions; air sweep and runner ejectors; an oversize, 12- to 20-oz. heating cylinder; a 30-hp., 56-g.p.m. hydraulic pump that increases injection rate from 8.75 to 10.7 cu.in./sec. *The Fellows Gear Shaper Co., Springfield, Vt.*

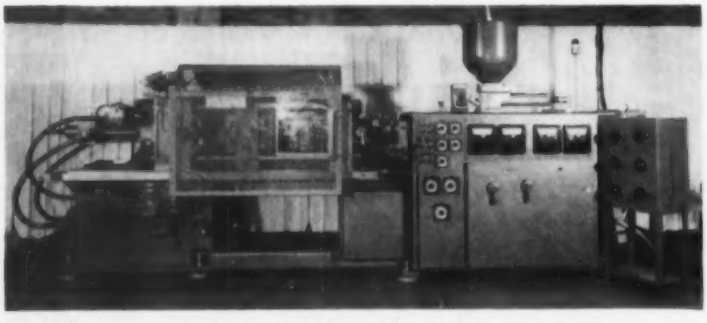
Semi-automatic small molder

The Super-Eldorado injection molding machine adds the advantages of semi-automatic operation and push-button controls to the features of the standard Eldorado Mini-Jector. The new Model 70VC105 is designed to produce small plastics parts, shoots up to 1.5 oz. of vinyl resin. Vertical clamping and absence of obstructing front tie rods facilitate insert work. Maximum mold size is 6 by 5.1 in. horizontally, by 5 in. deep. Push buttons, located on a front console, actuate solenoid valves which control the flow of pressurized oil in the self-contained Vickers hydraulic system.

Top injection pressure is about 21,000 p.s.i. Both hands of operator must be used simultaneously to press separate buttons to close clamp after inserts or loose cores are placed in mold. The new push-button controls enable one operator to run two or more machines, even when inserts are involved. *Newbury Industries, Inc., Newbury, Ohio.*

*Prices are deemed to be F.O.B. sellers' plants (unless otherwise stated), are for "standard" models, and are subject to change without notice. The publishers and editors of MODERN PLASTICS do not warrant and do not assume any responsibility whatsoever for the correctness of the same, or otherwise.

NEWBURY Super-Eldorado injection molding machine is designed to produce small plastics parts.



FELLOWS medium injection machine shoots 6 oz. straight or up to 10 oz. with prepacking. Accommodates mold bases up to 15 by 25 inches.

Sprayup equipment

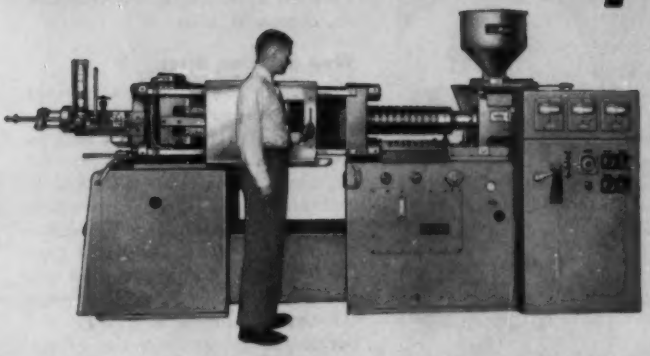
The Fiberform spray molder is claimed to deliver more than 2000 lb./hr. of mixed fibrous (not chopped) glass and polyester resin for sprayup molding. (This is much more than one assistant can roll out. A better figure is a production rate of 100 to 150 lb. of laminate per man-hour.) Glass contents up to 40 or 50% are said to be possible with good wetting-out.

The gun is fire-proof, requiring no electricity because it is wholly air-operated. Thickness variation in the laminate can be held below 15%; therefore, **(To page 48)**

Produce Plastics Profitably!

Model H-400
4-6 oz. CAPACITY

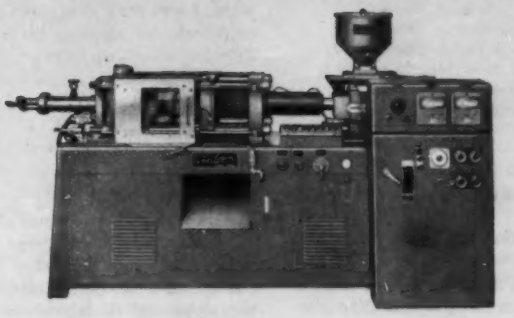
This automatic Van Dorn plasticizes 100 pounds plus per hour, has 175 tons clamping pressure, and achieves up to 840 dry cycles per hour. This press also features: Fast Mold Set Up, Four Tie Bars, Adjustable Toggle Stroke, and Maximum Operator Protection.



SELECT A VAN DORN PRESS

Model H-300 3 oz. CAPACITY

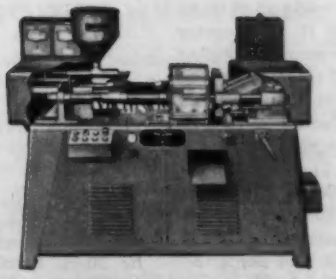
This automatic Van Dorn plasticizes 65 pounds plus per hour, has 75 tons clamping pressure, and achieves up to 1200 dry cycles per hour. This press also features: Fast Mold Set Up, Four Tie Bars, Adjustable Toggle Stroke, and Maximum Operator Protection.



BEST FOR YOUR NEEDS

Model H-260 2½ oz. CAPACITY

For greater efficiency, this automatic Van Dorn has a High Capacity Heater. The press plasticizes 30 lbs. plus per hour, has 30 tons clamping pressure, and achieves up to 720 dry cycles per hour. This press also features a Fast Mold Set Up.



Write for Detailed Information

The Van Dorn Line also includes 2 oz. and 1 oz. capacity presses, and scrap granulators.

THE VAN DORN IRON WORKS CO.
2685 East 79th Street • Cleveland 4, Ohio

Van Dorn
Established 1872

NEW MACHINERY- EQUIPMENT

(From page 46)

FIBERLAY sprayup gun is shown spraying resins, glass fiber, and ground cork simultaneously to construct a low-density, low-cost core. By using continuous fiber with aggregate, each particle is firmly tied together, thereby making delamination all but impossible.

high strength is obtained because of 1) high glass content, 2) continuous fibers, and 3) control of direction of fiber deposition. A wide range of resinous materials—road oil, epoxies, filled gunks, asphalt—in addition to polyesters can be sprayed. (See also "Sprayup—exciting economies for reinforced plastics," MPL, May 1959, p. 85.) Price of complete unit: $3995. *Fiberlay, Inc., 1158 Fairview North, Seattle, Wash.*

Vacuum metallizers

The PH-6 family of horizontal vacuum evaporators is made up of three models: 4, 5, and 6 ft. in diameter and length. The vacuum pumping system with each of these is sized to obtain pumpdown in about 10 min. during normal production operation. The vacuum system consists of five major components: 1) vacuum poppet-valve and baffle, 2) diffusion pump, 3) diffusion booster pump, 4) one-stage gas-ballasted mechanical pump, and 5) a unit that holds the diffusion pumps. Power requirements are 22.5 k.v.a. for the small unit, 51 for the largest, with about 30% of each figure going to the filaments. Each evaporator is equipped with a thermocouple gage to indicate pressure between 1 and 3000 microns Hg and a discharge gage for pressures from 0.01 to 25 microns. Numerous special modifications and accessories are available. *Kinney Mfg. Div., New York Air Brake Co., 3529 Washington St., Boston 30, Mass.*

Web-printing drier

The Double Hot-Air Jet is intended for between-color drying in multicolor printing on web stock such as plastics films. The double stream of air, blown in opposite directions, is concentrated on the web *surface*, where the heat and solvent transfer is needed. This results in rapid drying before the full thickness of the web has a chance to overheat. Air exhaust is uniform over the web. Because of the concentration of the warm air at the point of use, less air, therefore, less heat energy, is needed than in many oven-type driers. Jets can be installed in series to suit needs of any printing line. Available sizes: 10 to 100 in. long, 6 to 12 in. wide, 3.5 to 6 in. deep, delivering 20 cu.ft./min. of air per 10-in. length. Printing speeds up to 195 ft./min. can be obtained with a single unit, nearly twice that with two in series. *Comac Engineering, Inc., 22 W. Putnam Ave., Greenwich, Conn.*

Sheet thermoformer

The Pro-Vac sheet former should be especially useful to firms making production runs requiring frequent changeovers or doing medium-size, prototype and testing work. It combines semi-automatic operation, a 24- by 30-in. forming area, and forming versatility with a $3500 price tag. High-speed drape mechanism is adjustable to 10 in., and machine has plug-assist attachment (accessory). Heating, forming, cooling and ejection phases of cycle are controlled by two timers adjustable in 0.5-sec. increments. Drape action is operated by two synchronized air cylinders that also strip pieces from mold. Heater can reach temperatures up to 1200° F., provides uniform heat over whole range of clamping areas from 12 by 12 in. to maximum. A roll-feed accessory is available for skin or blister-pack forming. Complete production changeovers can be made in half an hour or less. *Auto-Vac Co., 1984 State St. Ext., Bridgeport, Conn.*

Saturating press section

A two-roll pressure nip for heavy-duty use in paper-saturating and impregnating machine lines features open-frame construction for quick and easy roll removal. It has heavy-duty bearings, an air-loading system, mechanical means for setting nip accurately, and chrome-plated rolls. Doctors for cleaning rolls can be provided. *Black-Clawson Co., Dilts Div., Fulton, N. Y.*

Resilience tester for foams

The Nopco Ball-Rebound Tester measures the height of rebound of a ⅝-in. steel ball when dropped from 18 in. above a flexible foam specimen. It is felt that because of the relatively high rate of loading, which is more representative of some use conditions than low-rate load/deflection tests, such factors as creep behavior and pneumatic damping among the foam cells may significantly influence test results. Thus, foams ranked in one order by low-rate tests may be ranked differently by the Ball-Rebound test. The Model CS-111 tester consists of a graduated, clear drop tube that reads directly in percent recovery of the initial 18-in. height, plus a magnetic **(To page 50)**

AUTO-VAC sheet thermoformer combines semi-automatic operation, 24- by 30-in. forming area, forming versatility.

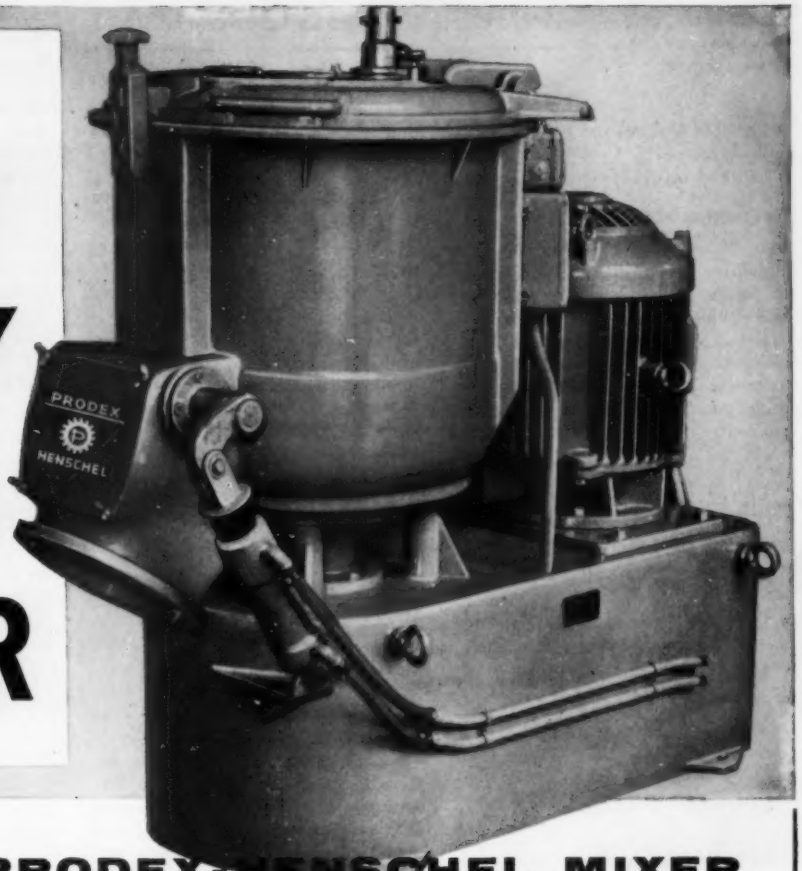
The

NEW

PRODEX

HENSCHEL

MIXER



THE NEW PRODEX-HENSCHEL MIXER

is used successfully in many installations here and abroad to prepare compounds ready for extrusion and molding, such as: **unplasticized rigid PVC dryblend, plasticized PVC dryblend, polyethylene colorant powder mix, cellulose acetate dryblend, PVC record compound, etc.**

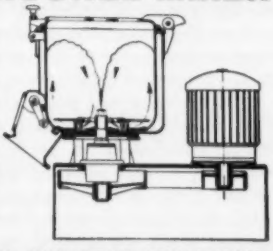
The PRODEX-HENSCHEL MIXER performs intensive dryblending and thorough dispersion of colors, pigments, fillers, stabilizers and/or plasticizers with plastics powders or granules.

It permits, if desired, the mechanical (frictional) heat-up of plastics powders faster and more uniformly than by conduction or radiation.

The unique principle of fluidizing dry powders so that they can be mixed like liquids, plus controlled shearing action, result in mixing quality and mixing speeds heretofore not obtained.

Design and Operation of the PRODEX-HENSCHEL MIXER

A cage-like ring of pins rotates concentrically around a stationary ring of pins. The rotating member also carries specially shaped blades and impellers which aerate and propel the powders to be mixed. The action is similar to that of a high-speed stirrer. The aerated powders or granules flow downward through the center of the rotating ring and pass through the zone of shearing between the rotating and stationary pins. The blend then moves upward along the wall of the mixing chamber. The entire batch rotates slowly around the axis of the mixing chamber. The rotating member of the mixing mechanism is usually operated at peripheral speeds of 100 to 200 ft/sec. The spacing between the rotating and stationary pins determines the shearing action. The shearing action controls mixing and dispersion as well as mechanical heat-up.



NEW APPLICATIONS OF THIS NEW MACHINE ARE FOUND DAILY. INVESTIGATE HOW IT COULD INCREASE THE EFFICIENCY OF YOUR PROCESS. ARRANGE FOR A DEMONSTRATION WITH YOUR MATERIAL.

PRODEX

PRODEX CORPORATION

FORDS, NEW JERSEY · HIllcrest 2-2800

Manufacturers of Process and Extrusion Machinery

ASK FOR BULLETIN M1

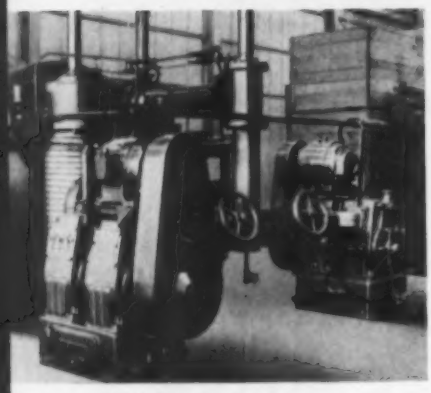
NEW MACHINERY-EQUIPMENT

(From page 48)

suspension and release for the steel ball. Price: $175. *Custom Scientific Instruments, Inc., Kearny, N. J.*

Vacuum coater

The Model 427-4, 72-in. vacuum metallizer uses a "modular" approach to design to gain pumping capacity and flexibility at no increase in cost. The pumping system comprises two identical "teams" of three pumps—mechanical, diffusion, and booster—each team being connected independently to the vacuum chamber



STOKES 72-in. vacuum metallizer has two teams of roughing, finishing pumps.

through its own high-conductance manifold and valve. Either of the diffusion-plus-booster pairs, and either of the mechanicals, can be cut out for routine maintenance or checking without shutting down the metallizer. During normal operation, with both teams operating, pumping capacity is 22,000 cu.ft./min. at 0.5 micron Hg pressure, sufficient to pump down the clean, dry chamber to normal coating pressure in 5 min. or less. If even faster cycles are desired, a third mechanical pump can easily be added. Pump sequence is electrically interlocked to prevent accidents, and normal pumping and metallizing cycle is automatically controlled. Automatic filament firing and vacuum break are optional extras. *F. J. Stokes Corp., 5500 Tabor Rd., Philadelphia 20, Pa.*

Dust-repelling cleaner

"Like-Magic" anti-static wax and cleaner type NI-5 cleans clear plastics and prevents accumulation of static charge and dust for months. Not inflammable or toxic, the solution is simply wiped on, allowed to stand for a few minutes, then polished off. It has performed well in such difficult applications as ladies'-wear storage/display drawers, outdoor signs (it lasts through several rains and prevents drop marks), and lighting fixtures. In independent tests with acrylic sheet, for example, this cleaner did not craze the sheets and provided a coating that retained its full initial anti-static rating through three months' storage at room temperature and 50% R.H. (However, repeated wiping of the coated surfaces with a damp cloth did reduce anti-static rating.) Price: $4.75 for a single gallon. *Like Magic Products Co., 208 E. 120th St., New York 35, N.Y.*

Universal testing machine

A new, compact testing machine can make over 15 different strength tests on materials. With accessories, tests of compression, flexure, tension, hardness, shear, bonding, and others are possible. It operates on a dead-weight weighing principle (no springs) and has no complicated electronic circuits. It is claimed that unskilled persons can operate the tester. Pieces or parts up to 12 by 12 by 16 in. can be handled. Standard test ranges are up to 100 lb. or 1000 lb.; optional ranges of 300 lb. and/or 1500 lb. are available. Readings are made from a linear dial gage, but an autographic stress/strain recorder is available. *Testing Machines, Inc., 72 Jericho Tpke., Mineola, N. Y.*

Improved preformer

The Logan 125-ton preformer has been redesigned as follows: the cylinder head casting is larger; all hydraulic lines are now connected to a common manifold; the oil cooler has been repositioned to make it easier to hook up to water lines; and a new acrylic safety guard not only protects the operator but permits a clear view of the work. *Logan Hydraulics, Inc., 4901 West Lawrence Ave., Chicago 30, Ill.*

Band and cartridge heaters

A new line of cartridge heaters have cases made of 304 stainless steel and accurately held within 3 mils of the stated outside diameter for good fit. Good fit and stainless shells not only mean better contact and heat utilization, but also give longer life. Hi-Temp cartridge heaters are available in these diameters: ⅜, ½, ⅝, and ¾ in., in lengths from 1.5 to 10 inches. Most necessary wattages can be supplied.

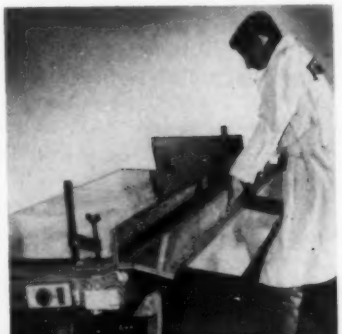
The same maker offers band heaters with heavy round tightening rods that permit firm, uniformly close contact of the entire band with the surface to be heated. The tightening screws pass through the rods, which are welded to the lips of the band. Thus the tightening force of the screws is distributed over the whole width of the band. *Fast Heat Element Mfg. Co., 3274 W. Fullerton Ave., Chicago 47, Ill.*

Screw for reinforced plastics

The Rivet-Head Nibscrew has teeth or "nibs" projecting from the underside of its head. These teeth bite into the plastic surface and keep the screw from turning while a nut is tightened on. Large-clearance, round holes can, therefore, be used. Nibs do not chip plastic, smooth head of screw (it has no slot or cross) doesn't snag clothing or scratch surfaces that may rub against it. Can be dis- and re-assembled. *Shakeproof Div., Illinois Tool Works, St. Charles Rd., Elgin, Ill.*

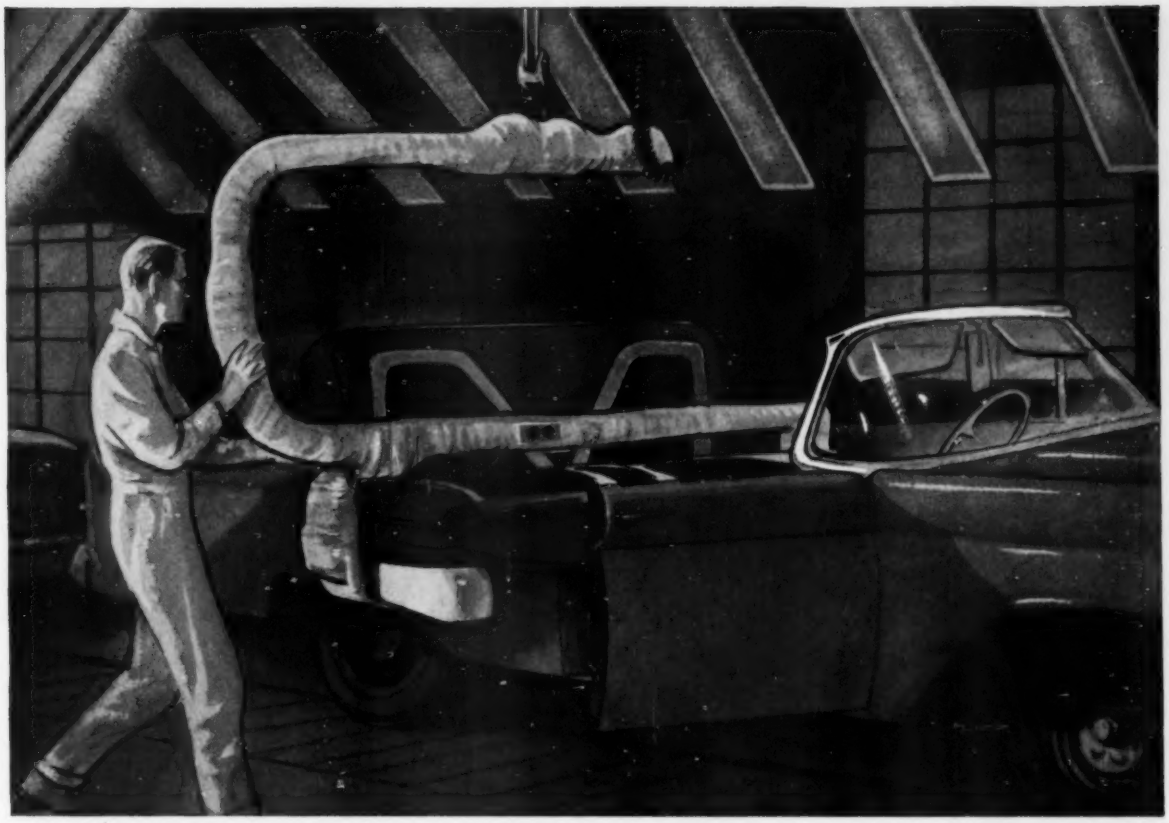
Postforming jig

A portable jig for postforming decorative laminates has been developed by Formica's application engineering



FORMICA portable jig for postforming decorative laminates has folding legs and a removable bending frame.

department. Heating is accomplished by a new radiused-increment, 1.6-kw. heater made by Plastiform, Inc., Houston, Texas. The portable jig has folding legs and a removable bending frame that knock down into a compact unit easily carried to the job site by fabricators. Details for building unit may be obtained from *Formica Corp., 4614 Spring Grove Ave., Cincinnati 32, Ohio.*—**End**



Nalzin® N, new co-stabilizer for automotive type vinyl sheeting and extrusions, checks sulfide staining... *actually increases heat stability*

Nalzin N, new National Lead Company zinc organic co-stabilizer, inhibits sulfide staining and boosts heat stability of automotive type vinyls. It is intended for use with Invin* 91 or other barium-cadmium stabilizers.

Vinyl stocks may be stabilized with Nalzin N/Invin 91 stabilizer combinations to show no sulfide staining when exposed to standard test solutions of ammonium polysulfide or hydrogen sulfide.

Such vinyl stocks show outstanding crystal clarity in clears; excellent non-yellowing, heat and light stability in clear, colored and filled types. Nalzin N co-stabilizer actually boosts the heat stability of these vinyls.

Ready-mixed Nalzin N/Invin 91 stabilizers are available

One such ready-for-use mixture is Invin* 205 stabilizer — a combination giving highest stabilizing action together with resistance to sulfide stain. Another Invin* 210 stabilizer provides a good balance of stability with highest sulfide stain resistance.

National Lead research has developed additives and stabilizers meeting specialized problems in *all* vinyl stocks made today . . . examples are the development of finely powdered stabilizers that eliminate pinholes in thin-wall high temperature electrical insulation; stabilizers that impound color-changing ferrous impurities in asbestos-filled flooring; stabilizer systems to promote highest fidelity in stereo phonograph records. Each simplifies processing, or extends useful product life.

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U. S. PLASTICS PATENTS

Copies of these patents are available from the U. S. Patent Office, Washington, D. C., at 25¢ each.

U. S. Pats., Jan. 13, 1959

Condensates of polynuclear phenols. W. Forster (to Reichhold). 2,868,768.

Condensates of p-aminomethylbenzoic acid and epsiloncaprolactam. B. Graham (to Ethyl). 2,868,769.

Polyamides. S. C. Temin (to Industrial Rayon). 2,868,770.

U. S. Pats., Jan. 20, 1959

Epoxide polymers. E. T. Borrows, D. G. Stewart, and D. Y. Waddan (to Shell). 2,870,099-100.

Polyalkylene oxide resins. D. G. Stewart (to Shell). 2,870,101.

Polyhydric alcohol resin. R. E. Van Strien (to Standard Oil). 2,870,102.

Cross-linked polyesters. J. K. Mertzweiller (to Esso). 2,870,112.

Pentaerythritol - acrolein resins. W. M. Kraft (to Heyden). 2,870,121.

Polymeric aminonitriles. G. L. Wesp (to Monsanto). 2,870,123.

Alkylene carbonate polymers. G. E. Ham (to Chemstrand). 2,870,124.

Epoxidized polyethylenic polycarboxylic acids. G. B. Payne and C. W. Smith (to Shell). 2,870,125.

Polythiolester fibers. W. A. Murphey (to Du Pont). 2,870,126.

Aromatic sulfur-containing polyesters. G. E. Ham (to Chemstrand). 2,870,127.

Ethylene polymers. J. M. Davison and J. F. Erdmann (to Union Carbide). 2,870,130.

High-density polyethylene. J. E. Guillet and H. W. Coover, Jr. (to Eastman Kodak). 2,870,131.

U. S. Pats., Jan. 27, 1959

Organo-phosphorus polymers. C. B. Scott (to Union Oil). 2,871,202.

Polymeric aminoalkyl-vinyl ethers. S. Melamed (to Rohm & Haas). 2,871,203.

Furfural, aromatic amine, and lignin polymer. O. R. Sweeney, L. K. Arnold, and J. T. Long (to Iowa State College). 2,871,207.

Oil-soluble butenylphenol-formaldehyde resins. R. M. Christenson and L. O. Cummings (to Pittsburgh Plate Glass). 2,871,208.

Chlorophthalic alkyd resin. J. W. Hyland, Jr. (to Allied Chemical). 2,871,215.

Polyglycidyl organic polysulfide copolymers. J. B. Howard (to Bell Telephone). 2,871,217.

Epichlorohydrin polymers. J. M. Baggett and M. E. Pruitt (to Dow). 2,871,219.

Epoxy resins cured with dianhydrides of tetracarboxylic acids. R. G. Shepard, Jr. and E. C. Dearborn (to U. S. Testing). 2,871,221.

Amine polymers. E. M. Hankins and S. Melamed (to Rohm & Haas). 2,871,223.

Aromatic amine aldehyde perchloroate resins. R. D. Cadle and R. W. Moshier. 2,871,224.

Dialkyl amine oxide, monovinylidene copolymers. J. A. Price (to American Cyanamid). 2,871,229.

U. S. Pats., Feb. 3, 1959

Urea-formaldehyde molding composition. A. R. Paz (to American Cyanamid). 2,872,425.

Polyepoxide emulsions. C. W. Schroeder (to Shell). 2,872,427-8.

Elastomeric plastigels. M. M. Schwartz. 2,872,429.

Diisocyanate - modified polyester - polyvinyl chloride composition. J. A. Parker and J. Versnel (to Armstrong Cork). 2,872,430.

Rubber, halogenated furfural-butadiene composition. M. T. Harvey and E. Breznak (to Harvel). 2,872,431.

Antistatic resin compositions. A. P. Metzger (to Union Carbide). 2,872,-432.

Stabilized polymeric N-vinyl pyrrolidones. S. A. Glickman (to General Aniline). 2,872,433.

Vinylaromatic hydrocarbon, maleic anhydride copolymers. B. B. Hibbard (to Dow). 2,872,436.

U. S. Pats., Feb. 10, 1959

Graft copolymer of alpha-chloroacrylonitrile. M. L. Miller (to American Cyanamid). 2,873,240.

Olefin oxide polymers. A. B. Borkovec (to Dow). 2,873,258.

Urea-formaldehyde adhesive. J. F. Corwin (to Koppers). 2,873,260.

Indan-dicarboxylic alkyd resins. J. C. Petropoulos (to American Cyanamid). 2,873,262.

Vinyl aromatic polymers. W. K. Schweitzer, Jr. (to Dow). 2,873,264.

Organosilicon copolymers. J. B. Rust (to Montclair Research and Ellis-Foster). 2,873,265.

Thermoplastic polymers. S. V. Urs (to Union Carbide). 2,873,266.

U. S. Pats., Feb. 17, 1959

Polyester-vinyl composition. R. M. Christenson, C. L. Parris, and E. E. Parker (to Pittsburgh Plate Glass). 2,874,141.

Polytrifluorochloroethylene - barium peroxide composition. W. E. Hanford, W. S. Barnhart, and R. H. Wade (to Minnesota Mining). 2,874,142-3-4.

Polyvinyl halide stabilized with lead chloride-silicate complexes. J. G. Hendricks and A. R. Pitrot (to National Lead). 2,874,145.

Light-sensitive cellulose esters. R. Deverell-Smith, J. Mitchell, and H. J. Twitchett (to Imperial Chemical). 2,874,146.

Phenolic resins from alkyl benzene hydroperoxides. H. Hock (to Ruhrchemie Aktiengesellschaft). 2,874,147.

Furfuryl alcohol-formaldehyde resins. L. H. Brown (to Quaker Oats). 2,874,148.

Polymeric emulsifiers. A. I. Medalia and H. H. Freedman. 2,874,151.

Propylene polymerization. L. W. Bowman and R. F. Leary (to Esso Research). 2,874,153.

U. S. Pats., Feb. 24, 1959

Polyamine derivatives of alkyl substituted benzenes. A. R. Bader and J. E. Hyre (to Pittsburgh Plate Glass). 2,875,161.

Vinylphenyl aliphatic aminocarboxylic acid polymers. L. R. Morris (to Dow). 2,875,162.

Esterifying epoxy resins. W. C. Stoesser, E. H. Summerfield, and W. R. Surine (to Dow). 2,875,165.

Extruding vinylidene chloride resin. W. M. Smith, Jr. and C. E. Best (to Firestone). 2,875,168-9.

Vinylidene chloride-vinyl chloride copolymer curcumin composition. C. E. Best (to Firestone Tire & Rubber). 2,875,173. **(To page 178)**

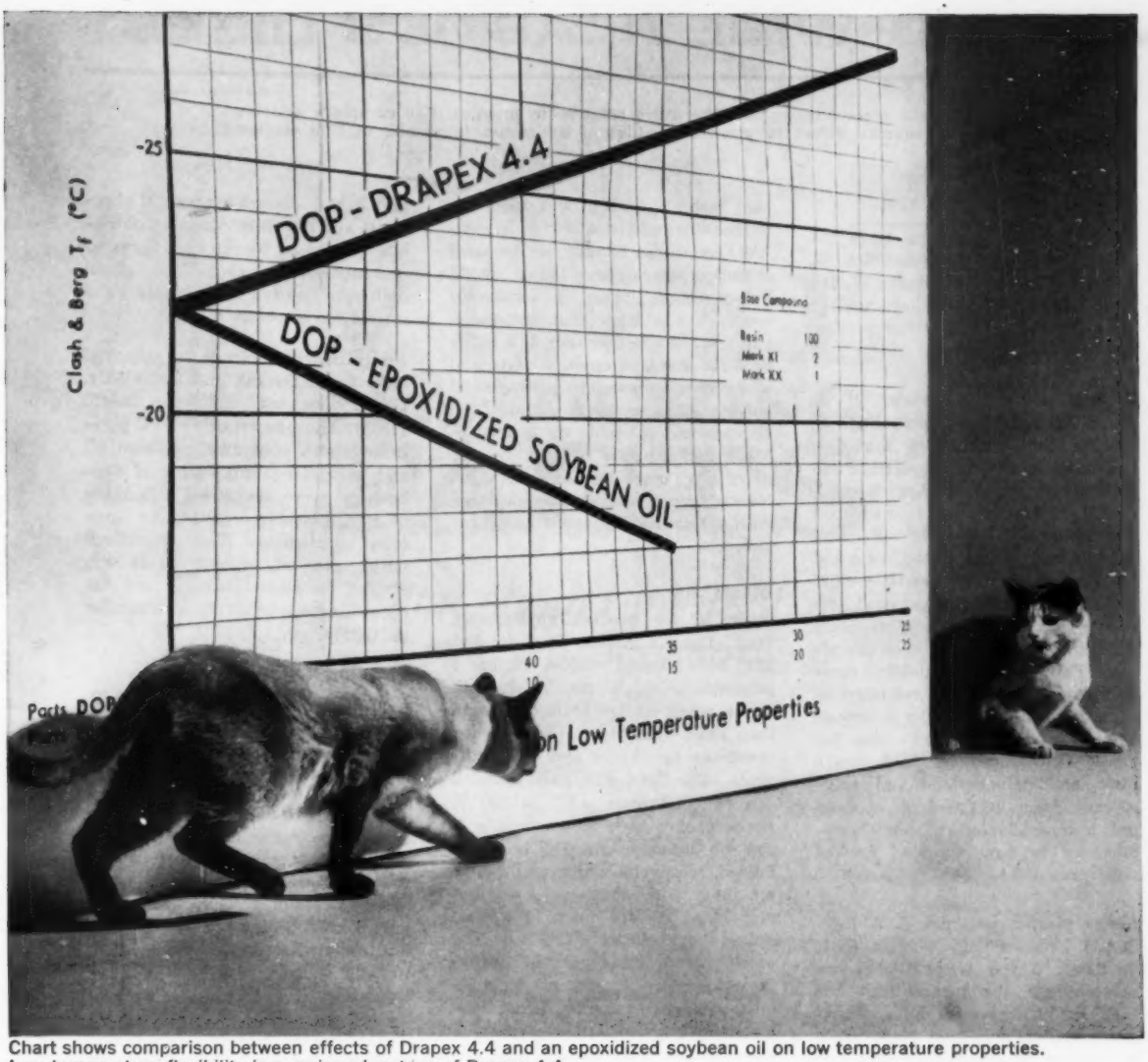

Chart shows comparison between effects of Drapex 4.4 and an epoxidized soybean oil on low temperature properties. Low temperature flexibility is a major advantage of Drapex 4.4.

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WORLD-WIDE PLASTICS DIGEST

Abstracts from the world's literature relative to plastics. For complete articles, send requests direct to publishers. List of addresses is at end of this section.

General

Impact of atomic energy upon the rubber and plastics industries. R. Roberts. Plastics Inst. Trans. 27, 1-8 (Feb. 1959). The use of nuclear radiation in the rubber and plastics sciences are reviewed.

What's new in materials? J. A. Mock. Materials in Design Eng. 49, 123-78 (Feb. 1959). New materials and methods, both in plastics and metals are described. Quartz-reinforced plastics panels withstood temperatures over 500° F. that burned and melted glass-plastic and steel panels. A clear styrene-methyl methacrylate copolymer of good heat resistance, outdoor weatherability and light stability has been developed. Four new alkyd molding compounds with excellent retention of insulation resistance after exposure to moisture and heat have been recently introduced. Type-6 nylon films and polyethylene and polystyrene foam in the form of films are also available. Polytetrafluoroethylene is now supplied backed with pressure-sensitive adhesives.

Soviet plastics progress. J. E. Fitzgerald. Product Eng. 30 23-25 (Feb. 9, 1959). There is practically no polyethylene production in the U.S.S.R., but they are doing extensive research and pilot plant work. A number of copolymers and terpolymers of styrene with good injection molding properties have been developed. High-impact styrene copolymers not yet available in the U. S. have been developed. New Russian-built injection molding machines are in use.

Engineers' guide to plastics. M. W. Riley. Materials in Design Eng. 49, 103-18 (Feb. 1959). The properties, uses, and prices of 19 general types of plastics are discussed from the engineer's viewpoint. Acrylonitrile, butadiene, and styrene terpolymers and blends are tough and strong. Typical applications include refrigerator and auto parts, pipe and fittings, and radio housings. Acetal resin has high strength, high heat resistance, and exceptional solvent resistance. Expected uses include mechanical parts and plumbing hardware. A new development to be expected in acrylics is a chlorinated material with a heat distortion temperature of about 260° F. In general, cellulosics should not be used at temperatures above 170 to 200° F. Polycarbonate resin is extremely tough, has a high heat resistance, and good fatigue strength. It is being used for gears, automotive parts, and electronic components. Chlorinated polyether has excellent chemical resistance and is stable up to 300° F. Major applications should be for parts for corrosive environments. New epoxy materials are expected with substantially increased heat resistance.

Materials

Nylon 6 for process applications. D. L. Duncan. Chem. Eng. 65, 130, 132, 134 (Dec. 1, 1958). Nylon 6 possesses a high tensile strength and a much higher impact strength than most nylon types. It has good resistance to alkalies and many solvents. The heat-stabilized nylon 6 can be used from —40° to 300° F. Because of a high melt viscosity it can be injection molded and extruded relatively easily to produce moldings with thin cross sections and large surface areas. Films of nylon 6 are almost glass clear and extremely tough. Pipe and fittings of nylon 6 are beginning to come on the American market. If not conditioned, a nylon 6 part will pick up moisture from the air and undergo a dimensional change in service.

Butadiene and its applications. W. J. Oldham and W. Webster. Plastics Inst. Trans. 26, 332-48 (Oct. 1958). Methods of synthesis of butadiene and the copolymers in which it is used are described. In addition to butadiene-styrene rubbers, butadiene is used in nitrile rubbers (butadiene-acrylonitrile), styrene plastics, modified acrylic plastics, and butadiene-vinyl pyridine adhesives. New polymers of butadiene are being developed.

Epoxidized jojoba oil as a stabilizer for vinyl chloride-containing plastics S. P. Fore, F. C. Magno, and W. G. Bickford. J. Am. Oil Chemists' Soc. 35, 469-72 (1958). Epoxidized jojoba oil was evaluated as a heat and light stabilizer for plasticized vinyl chloride plastics. It is a satisfactory heat and light stabilizer for tritolyl phosphate and bis (2-ethylhexyl) phthalate plasticized stock, and equal to or superior to epoxidized glycol dioleate, butyl epoxystearate, and epoxidized soybean oil.

Epoxidized plasticizers for polyvinyl chloride. J. Dvorak and E. Nejedly. Chem. prumysl. 8, (33) 209-12 (1958). The properties of PVC plasticized with epoxidized soybean oil and epoxidized butyl ester of soybean oil were compared with those of PVC plasticized with four common plasticizers. The epoxidized butyl ester of soybean acids was similar to dioctyl adipate and the epoxidized soybean oil was similar to tritolyl phosphate.

Molding and fabricating

Electroplating of plastic moldings. R. Uebigau. Kunststoffe 49, 45-47 (Jan. 1959). Molding compounds that can be electroplated contain a certain amount of nonmetallic, conducting substance. No special processing conditions are necessary. The molding compound is processed just like an ordinary phenolic material, compression molding being especially suitable. The finished articles are electroplated in the same manner as metallic objects, using identical solutions.

Basic laws for plastics screw extruders. G. Schenkel. Kunststoffe 49, 15-17 (Jan. 1959). The basic laws regarding single screw plastic extruders which are commonly accepted today, work out in practice only under certain conditions. This especially applies to calculations to determine optimum flight depth and length of screw, as well as rotational number. Since the physical processes taking place in the two main sections of the barrel are very different, it is necessary to treat them separately when formulating a basic law, and to combine the two sections only at a later stage. The basic problems and their solutions are discussed.

Applications

New urethane coatings: Tops in resistance. Chem. Eng. 66, 144, 146, 148 (Feb. 9, 1959). Urethanes are more resistant to alkalies and solvents than vinyls and better in heat durability, abrasion, and wear resistance. They are more resistant (To page 56)

VINYL PLASTICIZING FACTS

that should interest every processor

FACT 1. Reichhold PEROXIDOLS are epoxidized plasticizer-stabilizers for vinyls. They are economical and exceptionally *convenient* to use.

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CONCLUSION: All processors of vinyl resins will find the performance of Reichhold PEROXIDOLS offers a ready solution to many problems encountered daily in every application involving plasticized vinyl resins . . . and remember that PEROXIDOLS 780 and 781 may be ordered in combination with RCI's monomeric plasticizers to earn applicable quantity prices. For technical data on PEROXIDOLS, write to

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PLASTICS DIGEST

(From page 54)

to acids and water than epoxies and as good in alkalies and solvents. Concrete floors, solvent tanks, and chemical reactors coated with urethanes are performing satisfactorily. Various formulations are available and the coatings can be obtained as either one- or two-package units. The hardness, wear resistance, and chemical resistance of some two-package urethanes are compared with vinyl and epoxy resins. Adhesion of urethanes to wood, metal, and concrete is generally excellent, although pretreatment for the metal is recommended. Surface coverage varies from 300 to 750 sq. ft./mil/gal.

Do soling materials affect the health of the feet? Rubber and Plastics Age *39*, 747-48 (Sept. 1958). Tests made with leather and plastic shoe soling show that there is little difference between the two in two health factors—foot moisture and fungus infection.

'Papylon' synthetic papers. S. Okamura and H. Inagaki. Rubber and Plastics Age *39*, 671 (Aug. 1958). Papers are made from nylon or polyvinyl alcohol fibers bonded with butadiene-styrene rubber latex and polyvinyl acetate.

Bearings need no lube. Chem. Eng. News *37*, 46-47 (Jan. 12, 1959). Bearings are made by coating a Teflon-cotton fabric with phenolic resin and bonding sheets of this material to metal parts with an adhesive. These bearings require no lubrication.

Future for adhesives. D. W. Maher. Adhesives Age *2*, 44-47 (Jan. 1959). Future applications are considered. Automobiles, marine equipment, buildings, appliances, and furniture are fruitful fields for expansion in the use of adhesives.

Plastics in the electronics industry. R. L. Mondano and A. I. Simon. Plastics World *17*, 6-7 (Jan. 1959). Information on tensile properties of epoxy, nylon, and polysulfide plastics and effect of fillers on coefficient of thermal expansion of epoxy plastics is presented.

Properties

Study of the transition phenomena of chain polymers by the photoelastic method. M. Kaneko. J. Phys. Soc. Japan *13*, 1324-27 (Nov. 1958). The glassy transition phenomena of chain polymers can be studied by observing the temperature dependency of the photoelasticity of the materials. The transition temperature determined using this method agrees with the second order transition point by the specific volume method for polyvinyl chloride, but for polystyrene it is a little higher and rather near to the softening point by the dynamical elastic method.

Physical properties of plastics for photothermoelastic investigations. H. Tramposch and G. Gerard. J. Appl. Mech. *25*, 525-8 (Dec. 1958). Thermal-expansion coefficients, material fringe values, and the moduli of elasticity of an epoxy resin and two polyesters as functions of temperature were investigated. An experimental method was devised for rapid evaluation of new materials, and for rating their relative sensitivity to reference materials. On the basis of results obtained the epoxy resin was clearly superior to the polyesters for use in photothermoelastic applications.

Adsorption of polyesters on glass, silica, and alumina. R. R. Stromberg, A. R. Quasius, S. D. Toner, and M. S. Parker. J. Research NBS *62*, 71-77 (Feb. 1959). The adsorption of several saturated, linear polyester, polymethyl methacrylate, and di-*n*-butyl sebacate was studied under a variety of conditions. The adsorbents were type E glass powder, silica, and alumina. The glass powder and silica were nonporous materials; the alumina contained a large internal pore structure. The rate of adsorption of the polyesters on glass is very rapid and the adsorption isotherm is irreversible. Adsorption from a poor solvent is favored over adsorption from a good solvent. Metallic ions, in addition to silicon, appear to be involved in an electrostatic bond between the polymer and the glass. The Langmuir equation is obeyed at high-equilibrium concentrations, although there is nonconformity at the low concentrations.

An internal friction study of polytetrafluoroethylene. N. G. McCrum. J. Polymer Sci. *34*, 355-69 (Jan. 1959). A torsion pendulum was used to measure the internal friction of polytetrafluoroethylene. The crystallinity of the specimens varied from 48 to 92%, and the measurements were made over a wide temperature range. The site of each relaxation was assigned by observing the variation of relaxation strength and peak height with crystallinity. In this way amorphous relaxations were found to occur at 176.5° K. (0.60 cycle/sec.) and 399° K. (0.62 cycle/sec.). The crystallite relaxations occur at 291° K. (0.28 cycle/sec.) and the crystallite melting point, 600° K.

Polyester film. How long does it last? W. McMahon, H. A. Birdsall, G. R. Johnson, and C. T. Camilli. Materials in Design Eng. *49*, 94-95 (Feb. 1959). Useful service life of poly(ethylene terephthalate) film is defined as the exposure time at any humidity and temperature level before the tensile strength is reduced to two-thirds of the initial value. Dielectric breakdown strength is little changed by exposure to moisture and heat. Exposed film does not lose its dielectric strength until it is brittle. A decrease in insulation resistance on exposure to heat and humidity was caused by the progressive accumulation of particles on the surface. Some of these particles were hygroscopic and conductive in high humidity, and others were low molecular weight polymer brought to the surface by heat. Curves plotting the useful service life of 10-mil polyester sheet and 0.5-mil film against temperature at different humidities are given.

Testing

Spectrophotometric determination of styrene in a styrene-methyl methacrylate copolymer. A. V. Tobolsky, A. Eisenberg, and K. F. O'Driscoll. Analytical Chem. *31*, 203-04 (Feb. 1959). A rapid method for the determination of the styrene content of a styrene-methyl methacrylate copolymer was developed by determining the absorbance of a sample containing 1 mg. of copolymer per ml. of chloroform at 269 mμ.

Effects of plastics on bacteria. W. G. Walter, B. Beadle, R. Rodriguez, and D. Chaffey. SPE J. *14*, 36-37, 54 (Aug. 1958). An experimental program was designed to study the possibility of using one-service plastic bags for the transportation of aseptic samples of fresh milk to laboratories for bacteriological tests. Inhibitory or toxic effects of the plastics on the bacteria being studied would be cause for eliminating the material from use. A series of tests was made using bacterial cultures in plastics-containing agar mediums. In general, those cultures grown in the presence of plastics showed slightly higher counts than **(To page 180)**

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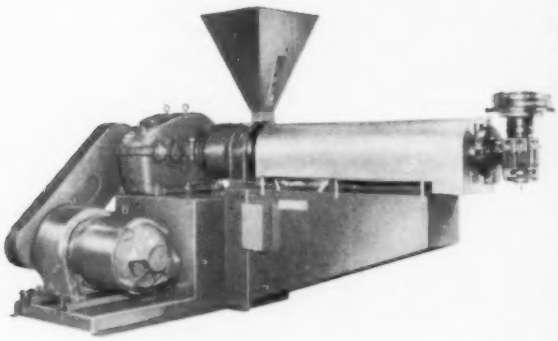

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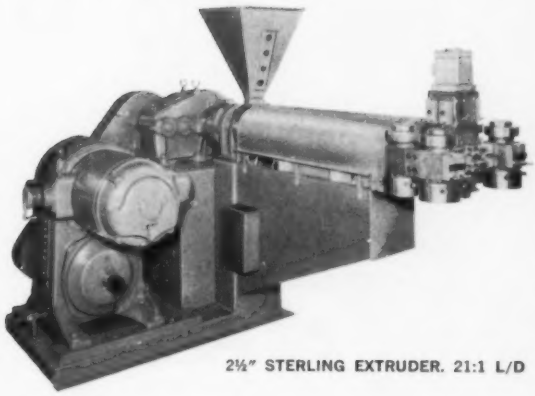
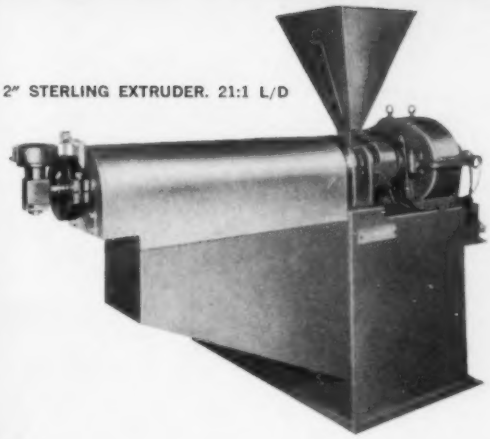


2½" STERLING EXTRUDER. 21:1 L/D

2" STERLING EXTRUDER. 21:1 L/D



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Thanks to the new NRC Mechanically Refrigerated Cold Trap"

. . . *says Jack Selsemeyer*
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Evansville, Indiana

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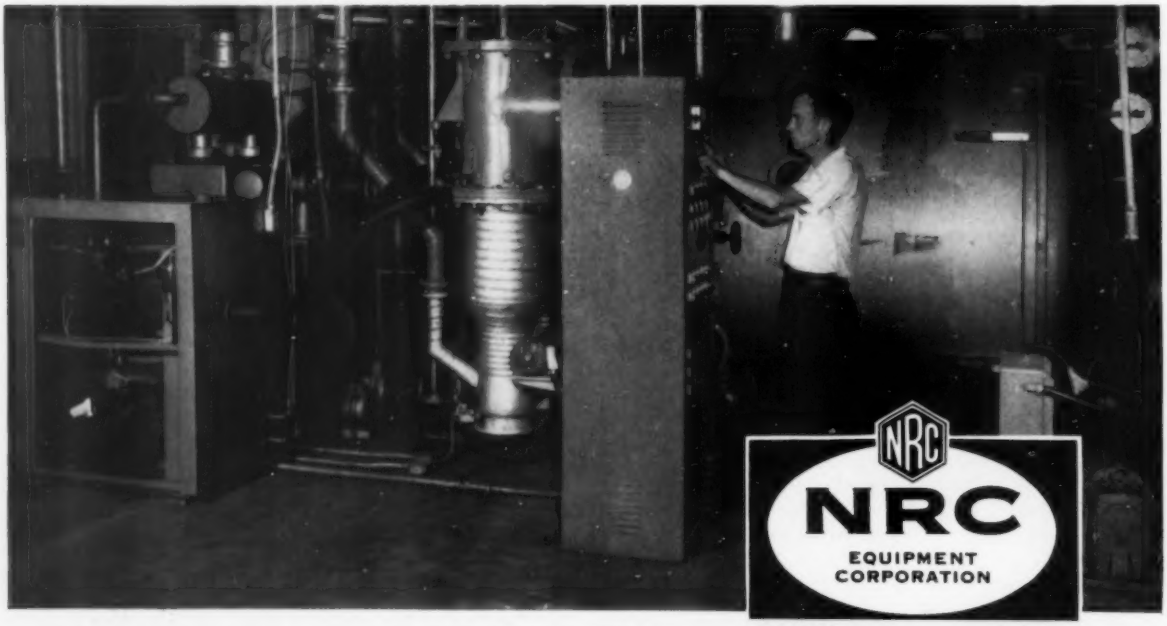
"We'd already placed the order for the fourth coater, when NRC engineers introduced us to the new mechanically refrigerated cold trap. At first we were skeptical, because we knew other attempts to solve the humidity problems with cold traps had proven expensive and ineffective. However, the ability of the NRC mechanical refrigerator to maintain the cold trap at −150°F, and the special design features of the latter made us decide to try it on one coater.

"Results were spectacular. Production rates and rejects were almost independent of humidity, so that our hot weather costs are way down and we've got a competitive advantage in being able to make good on deliveries. Unfortunately for NRC, after we installed similar systems on our other two coaters we had so much more usable summer capacity that we didn't need the fourth coater."

The NRC Mechanically Refrigerated Cold Trap Assembly consists of a special refrigerator and one or more copper coils flange mounted for positioning directly above each diffusion pump. It offsets high humidity by freezing out water vapors before they can add to the load on the diffusion pumps. The assembly is easily installed in coaters equipped with NRC pumping systems and is simply modified for other equipment. The standard 4 HP refrigerator will maintain two traps at −150°F, the temperature found most effective for coaters operating at the usual 0.5 microns pressure. More powerful refrigerators are available for coaters operating at lower pressures or equipped with more than two diffusion pumps.

This development is the latest of the many contributions which NRC has made to profitable metallizing. If you now operate or are considering the purchase of a vacuum coater, it will pay you to ask your nearest NRC sales engineer for full details on how you profit from these contributions. Write or phone today.



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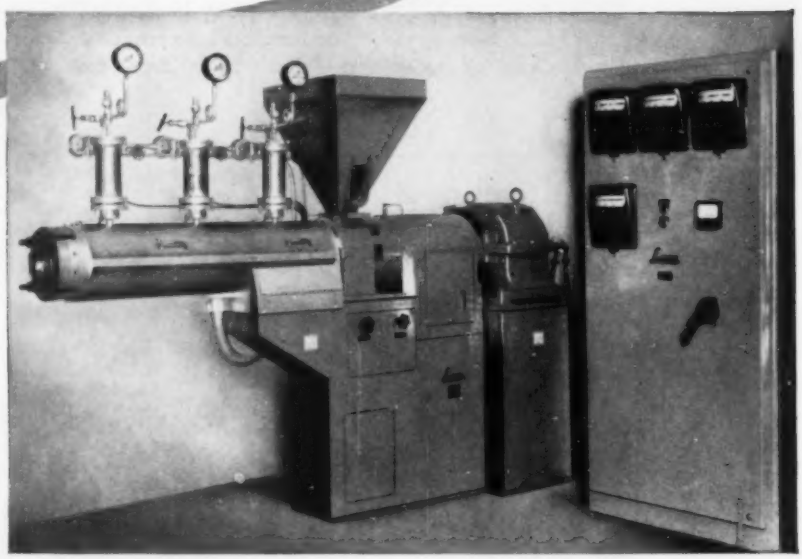

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- ☐ Laminating Units
- ☐ Edge Trimmers & Trim Disposal Units
- ☐ Surface or Center Winders
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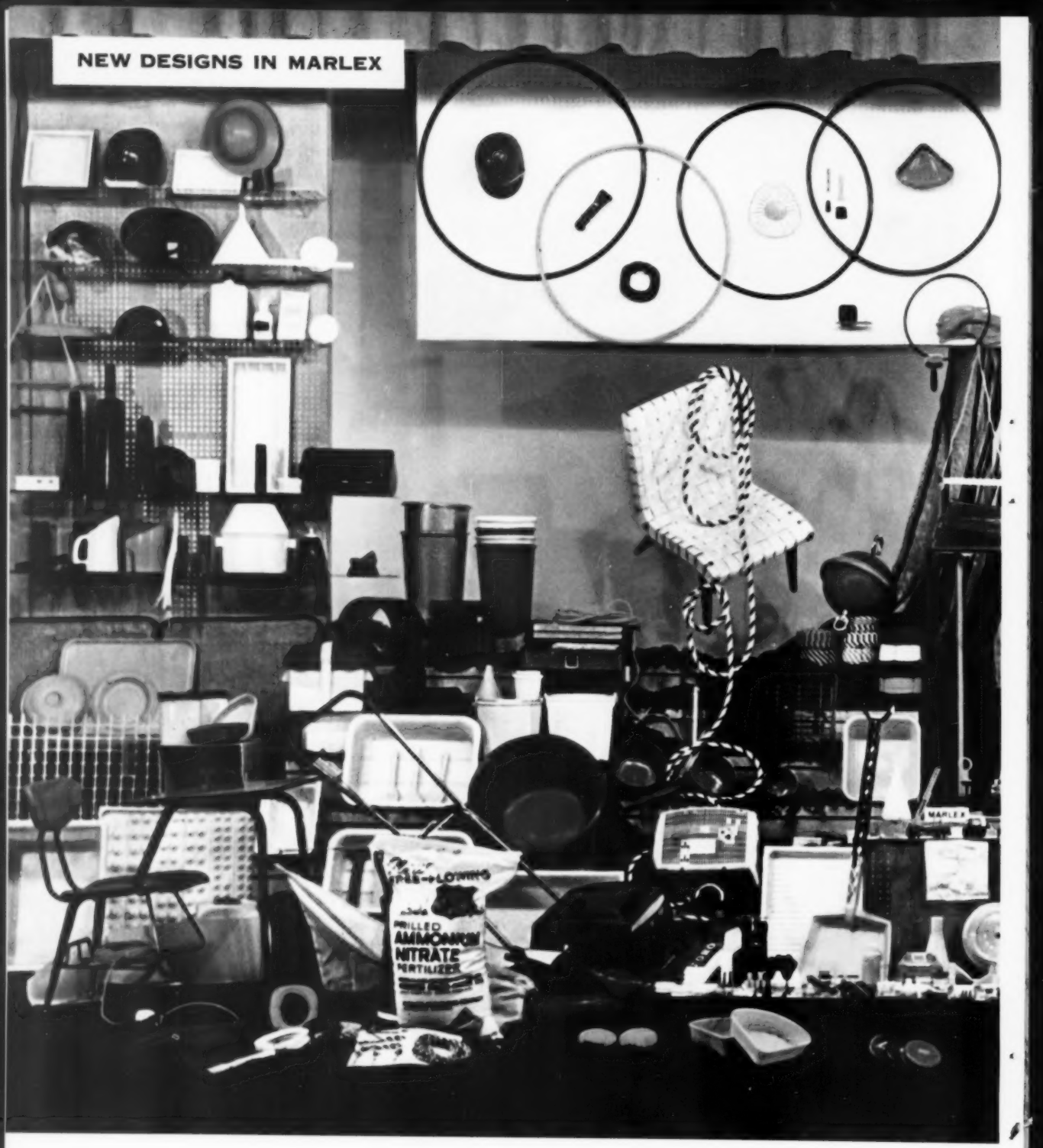

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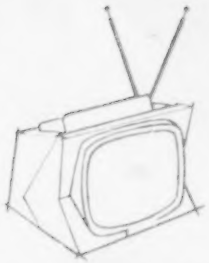

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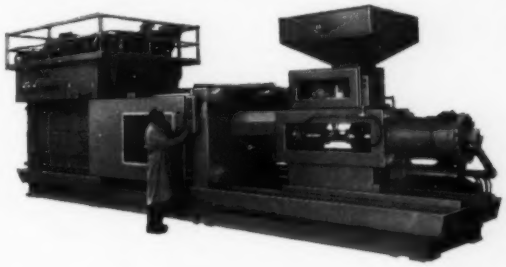
This 48 oz. high impact polystyrene TV cabinet back and this 43 oz. butyrate TV lens are typical Natco 800 production jobs at Buffalo Molded.

BUFFALO MOLDED INSTALLS NATCO 800's



Natco injection machines are cutting individual molding cycles as much as 20 seconds for this prominent custom molder. Both Buffalo and Erie plants of Buffalo Molded Plastics use Natco 800's.

These big, versatile 80 oz. machines provide high melt capacity—350 lbs./hr. . . . fast clamp action with full pressure build-up in less than one second . . . high speed injection—a full shot in just 3 seconds! These features all add up to more parts per shift.

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Duramold B	0.07	0.30	0.15	1.00	0.25	—
					(Boron added)	
Duramold N	0.10	0.50	0.25	1.50	—	3.50

For full information about these plastic-molding grades, contact your Bethlehem tool steel distributor.

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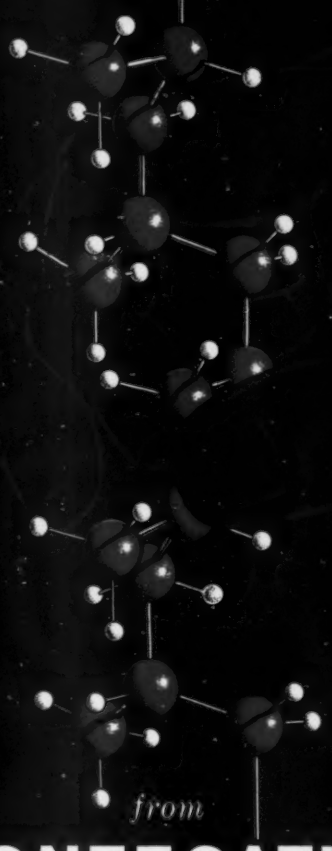

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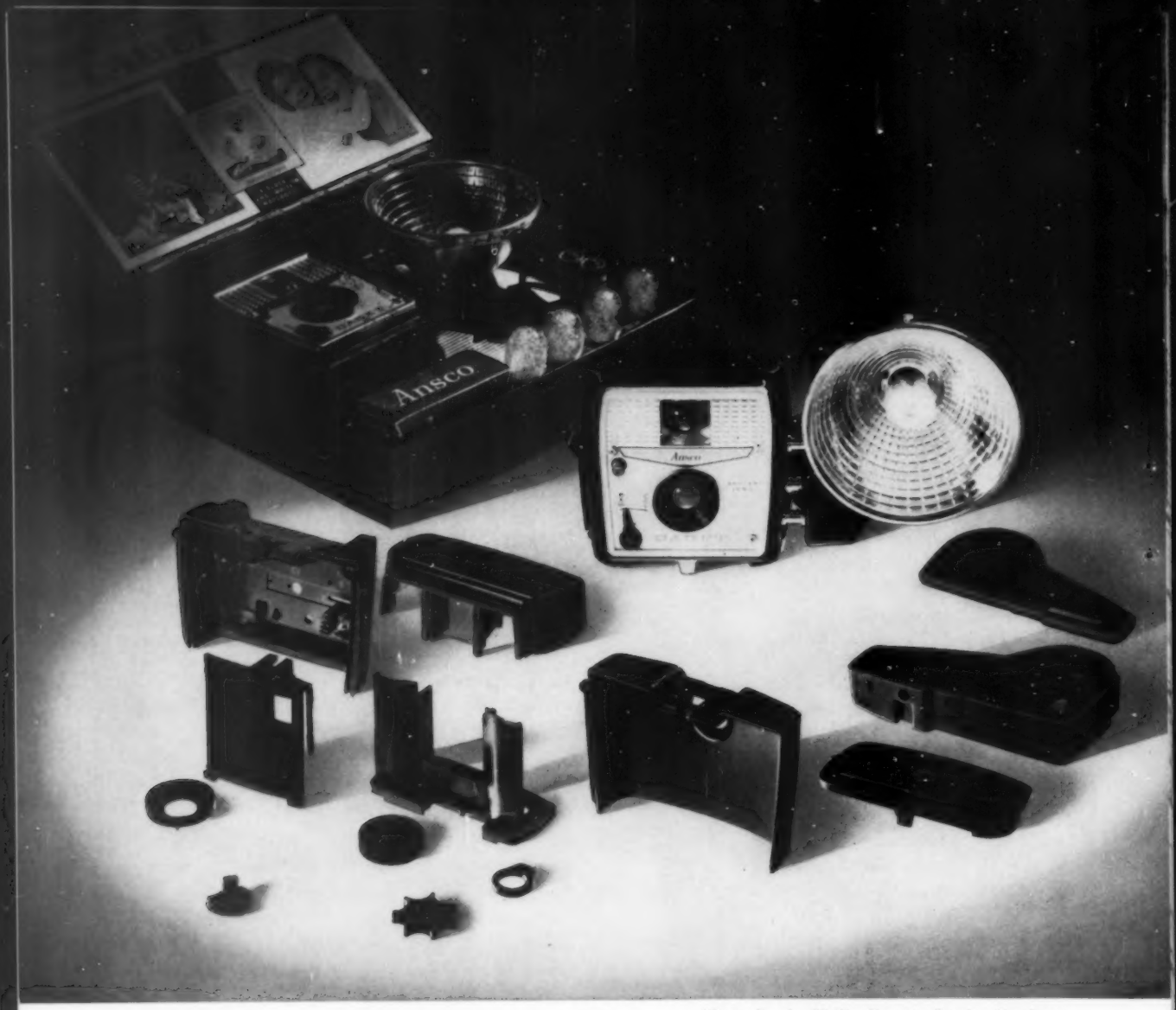

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4. Phenopregs mean cleaner molding operations. They eliminate the need for cleaning up after wet molding, saving time, labor.

5. Phenopregs reduce waste. This is because there is no spillage and no mold overflow.

6. Phenopregs cut storage and handling costs. Because only one material has to be stored and handled, Phenopregs greatly reduce costs for these items.

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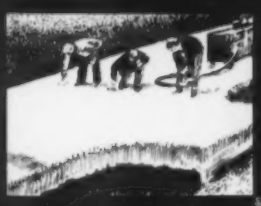
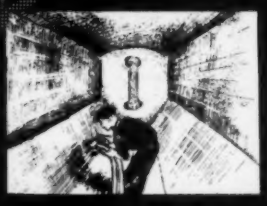


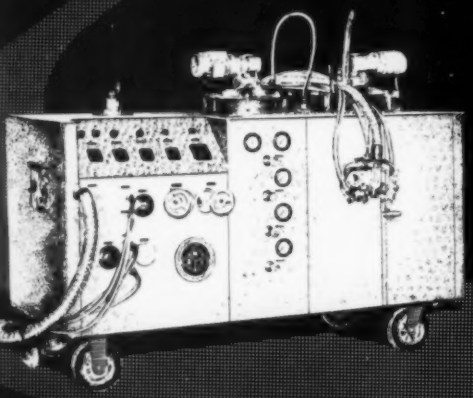
MAS-coating of a tunnel-cover

MAS-coating of the side walls of a clarifying plant

MAS-Spraying of a boat shell



MAS lining of a subterraneoues sewer in a chemical factory



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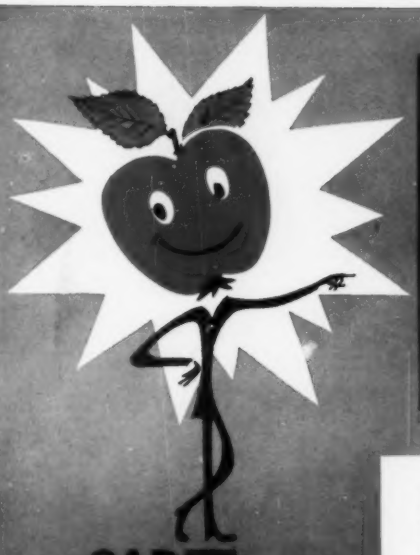

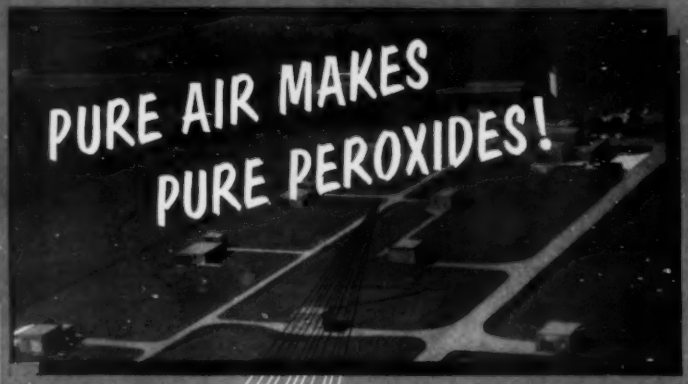

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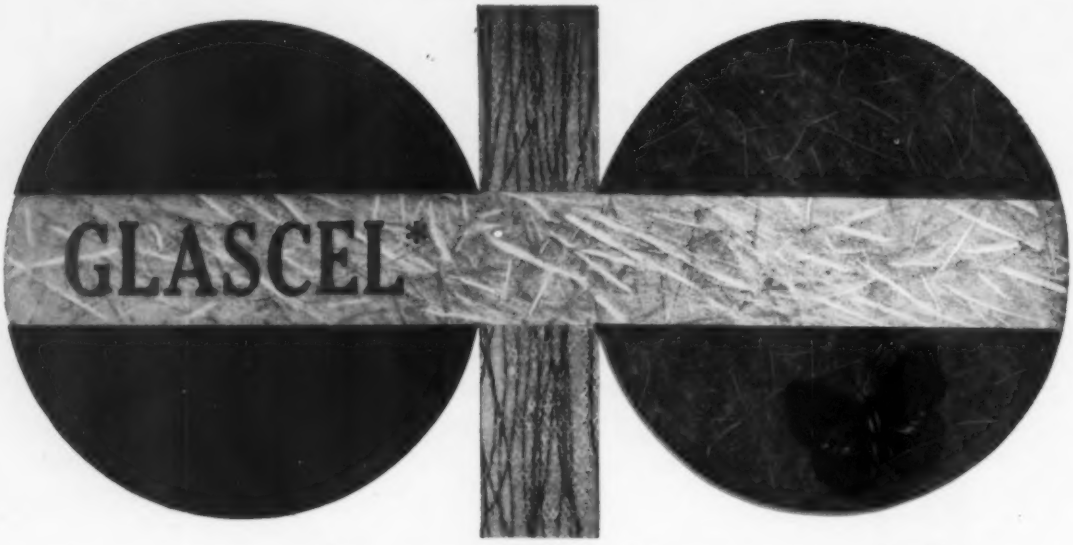

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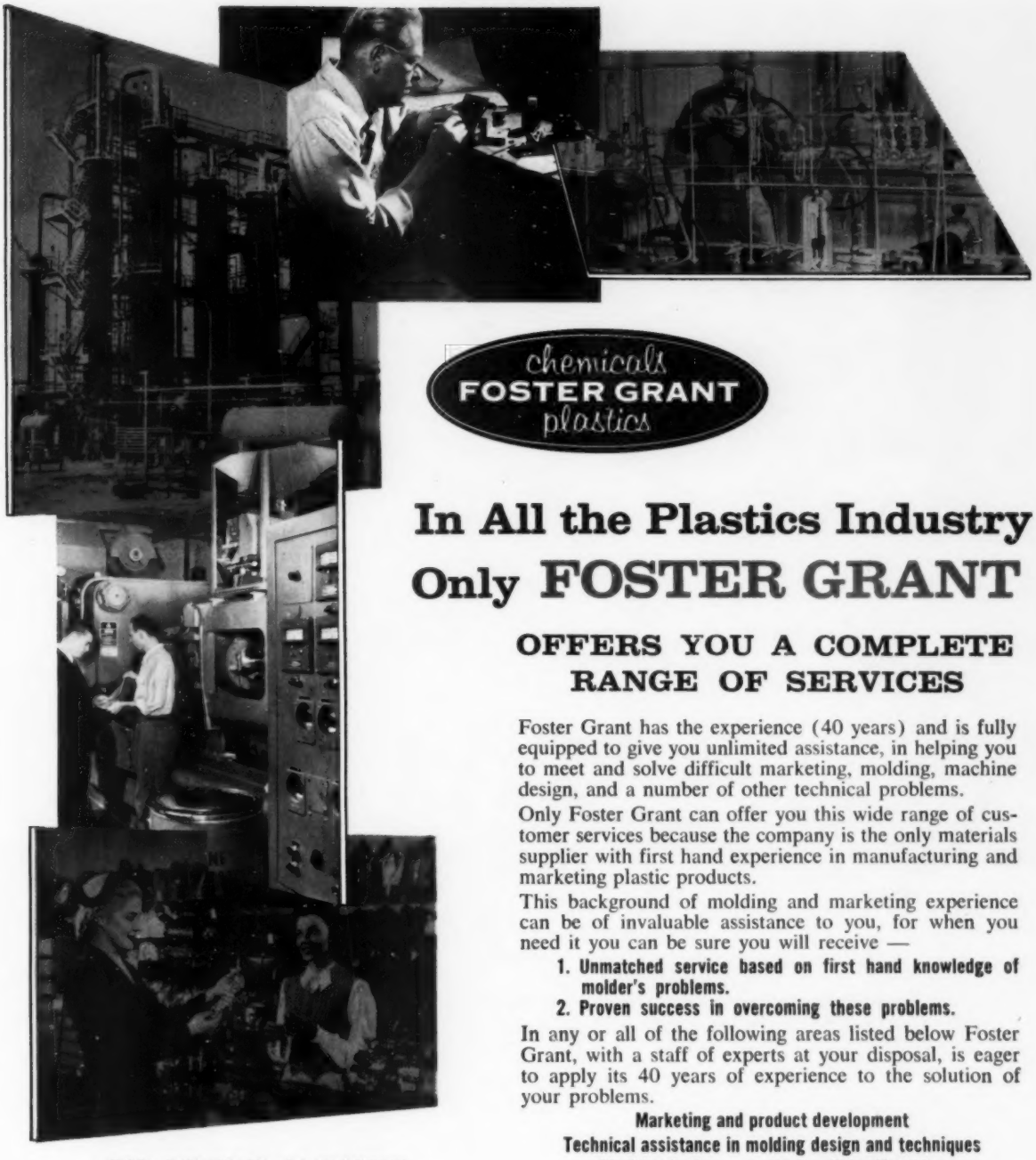

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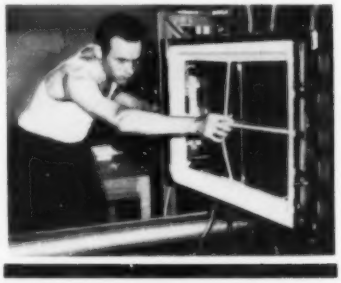

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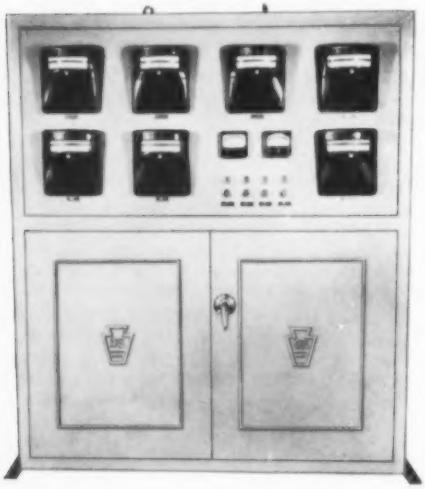

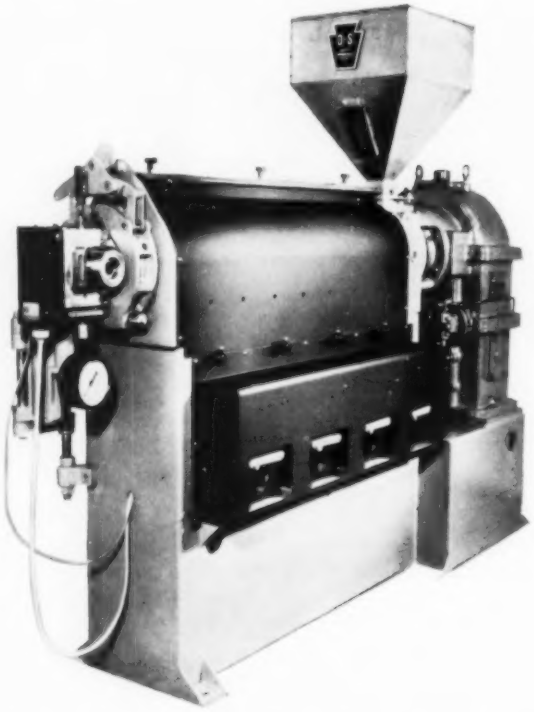

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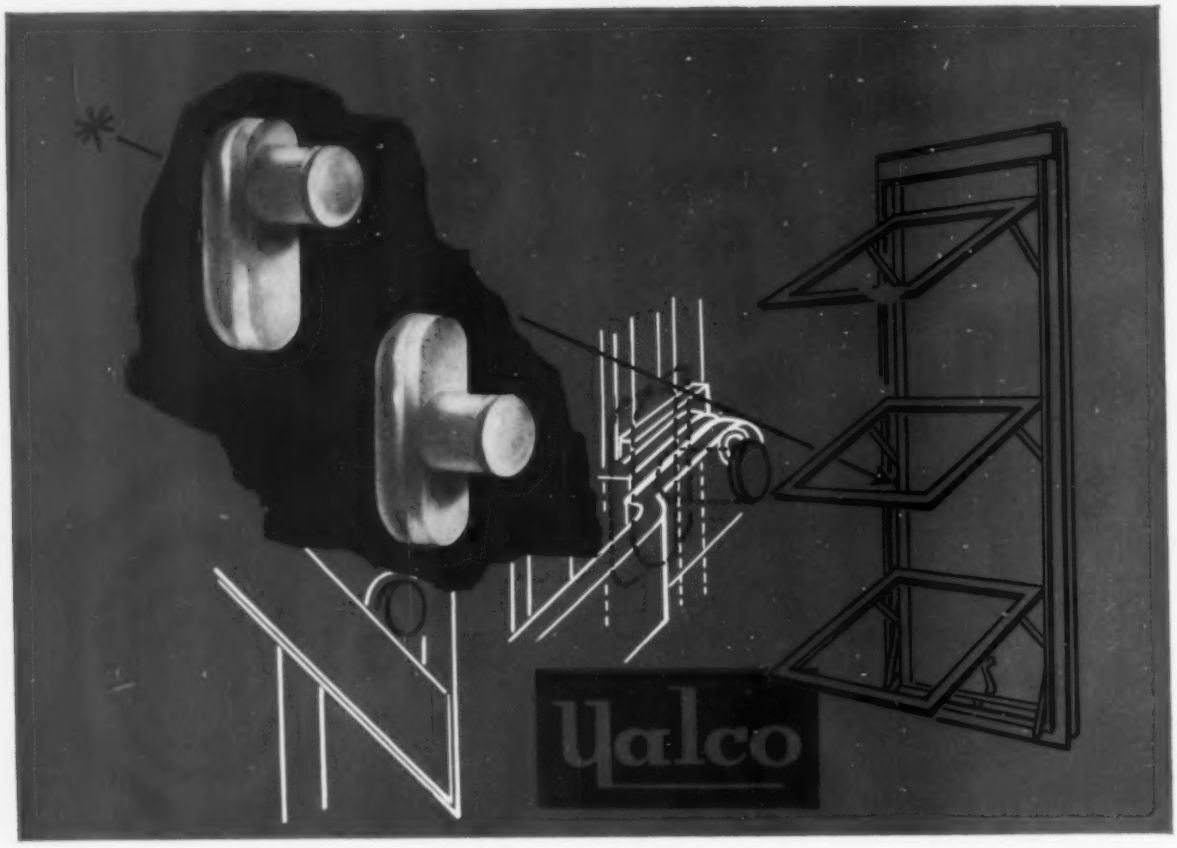

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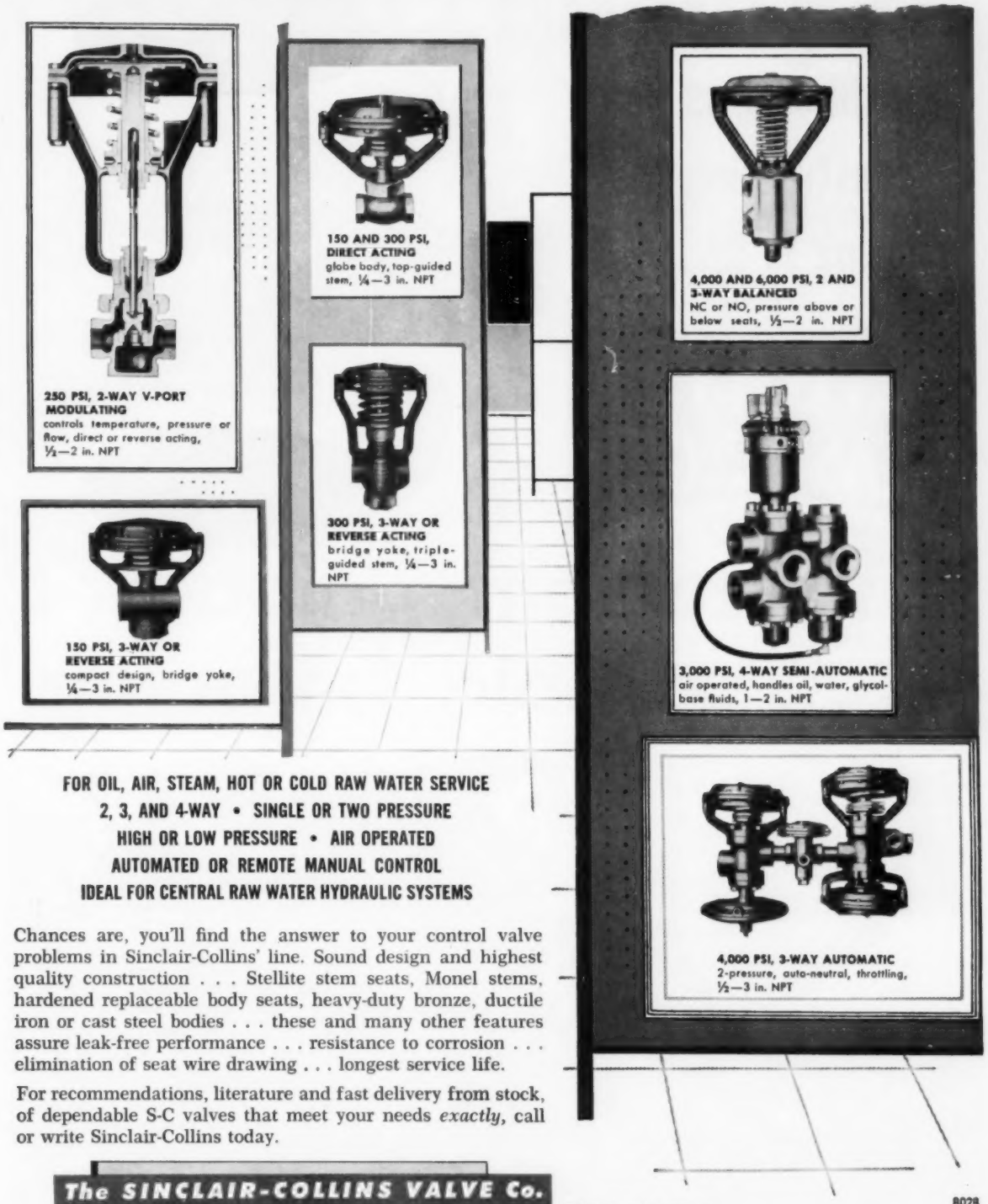
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Grueling use-test pits monomeric vs. polymeric plasticizers

Some years ago a vinyl upholstery manufacturer decided to field-test new materials for truck and transportation upholstery using a wide variety of monomeric and polymeric plasticizers, including Plastolein 9720. To compare *permanence* and *durability,* the different materials were installed on city bus drivers' seats. Here, seat upholstering would certainly be exposed to extraordinary abuse almost around the clock . . . continuous rubbing and flexing, city grime and grit, oil and grease.

After a certain period of time, all the upholstery containing monomeric plasticizers had failed. But all those made with polymerics, including Plastolein 9720, were still in excellent shape. With this evidence, the manufacturer concluded that only a polymeric plasticizer would meet its standards for truck and transportation upholstering, and protect its reputation. And Plastolein 9720 was chosen on the basis that it was the *lowest cost of all the fine polymerics tested.*

Today, Plastolein 9720 is *still* the lowest cost ploymeric plasticizer, and is *still* being used by this and many other manufacturers in such heavy-duty goods. Why not check 9720 yourself? Write Dept. F-6 for literature and sample.

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June 1959, Volume 36, Number 10

MODERN PLASTICS

Why the fast-growing market for BIG polyethylene containers?

Seven methods of manufacture give users what they want at the price they want

Ever since Plax unveiled the first king-size polyethylene container in 1952 (a blow molded 13-gal. carboy), cost-conscious firms engaged in the shipment, storage, or processing of corrosive problem products have been clamoring for larger sizes. Such larger sizes would enable them to replace many of their glass and metal packages at considerable savings in shipping, handling, and replacement cost.

In rising to meet this demand, manufacturers of large PE tanks have, with an assist from new materials developments, evolved a number of processing techniques that have enabled them to overcome earlier technological limitations. As a result, the industry today stands ready to supply containers with capacities ranging up to 500 gallons—with larger units likely.

Economies are substantial

Low weight, corrosion resistance, and nonbreakability are the three outstanding properties that combine to give the large PE container its substantial economic edge over glass and stainless steel, its two major competitors.

How these economies work out can be readily

SELF-SUPPORTING PE tank of 160-gal. volume is used in chemical processing and metal plating field. Made by Delaware Barrel & Drum.

TANKS OF 38-GAL. CAPACITY, produced for Plastineers on specially built 700-oz. injection machine, are made from blend of polyethylene, blue asbestos fibers, and other components. Production set-up includes extruder, coupled with mixer and heating system, which feeds compounded blend into an injection chamber before each shot is made.

illustrated by two typical cases—and many more could be cited would space permit:

• Hedwin's 15-gal. Cubitainer (more fully described below) serves to replace returnable glass carboys, 15-gal. drums, and other conventional containers. A standard glass carboy costs about $16 to $18, as against approximately $3 for the Cubitainer and its wirebound outer crate. Tare weight of the glass container and outer box is 74 lb., compared to approximately 14 lb. for the Cubitainer. The latter also requires less than half as much space as the carboy, for important shipping economies.

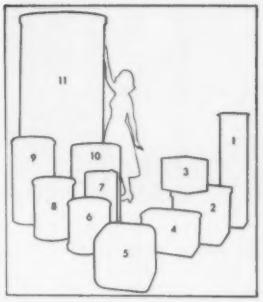
• Fifty-five-gal. shipping containers, such as made by Delaware Barrel & Drum, are equivalent in capacity to four standard glass carboys. Nevertheless, the polyethylene drums cost only one-third as much and weigh 80% less. Even with a steel drum overpack, they are lighter in weight and about 67% less costly than stainless steel drums.

Who makes what and how

Injection molding: Large-capacity injection machines now installed in numerous molding plants are capable of producing deep-draft containers having a capacity of 25 gallons or more.

Plymouth Industrial Products, Inc., Sheboygan, Wis., is injection molding Polyflexon tanks in 30- and 38-gal. sizes for use as salt and brine storage tanks in the water-conditioning field, for which they are available through Plastineers, Inc., Minneapolis, Minn., as well as processing tanks in metal plating installations, storage of plastics molding materials, and as

CARBOY, blow molded by Plax and marketed by Jones & Laughlin Steel in conjunction with an outer steel drum, costs and weighs one-third less than conventional glass containers, eliminates costly breakage problem.



THE COVER: typical polyethylene containers being made today. Producers, sizes, and production methods are: **1)** Delaware Barrel & Drum (DBD), 22 gal., can be made up to 150 gal., blow molded. **2)** American Agile (AA), 25 gal., can be made up to 180 gal., welded. **3)** AA, 7.5 gal., can be made up to 35 gal., welded. **4)** AA, 11 gal., can be made up to 90 gal., welded. **5)** Hedwin Corp. (Cubitainer liner), 15 gal., vacuum formed. **6)** AA, 10 gal., can be made up to 120 gal., centrifugally cast, and welded. **7)** DBD, 15 gal., blow molded, made in 5, 15, 30, and 50 gal. **8)** DBD, 25 gal., can be made in capacities from 5 to 500 gal., blow molded. **9)** Plastineers, 38 gal., inject. molded, also made in 30 gal. **10)** DBD, 55 gal., blow molded. **11)** DBD, 500 gal., blow molded, prototype.

storage units for pre-mixed batches of flour and other ingredients used by bakeries. Over 15,000 of these containers are currently being used by the baked goods industry.

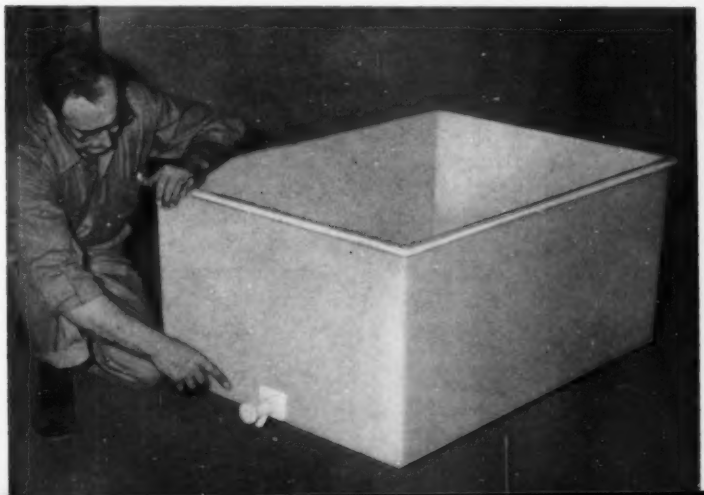
Both the material and the equipment used in making the tanks are somewhat unusual. Polyflexon is a controlled blend of virgin polyethylene, chemically resistant domestic blue-rock asbestos fibers, and other ingredients, with PE forming approximately two-thirds of the total compound. The compound, according to Plymouth, has better rigidity, tensile strength and stress-cracking resistance than uncompounded PE. Polyethylene from several resin suppliers is combined with the other components on special equipment developed by Plymouth Industrial Products and molded on a special type of high capacity injection machine.

The unit compounding machine, which includes a modified 8-in. extruder coupled with a mixer and heating system, blends the PE resin, reinforcing asbestos fibers, and other ingredients, feeding the finished compound into a heated, torpedo-less cylindrical tunnel or injection chamber. Using a valve gating arrangement, an injection ram then forces the viscous material into a temperature-controlled family mold where the tank and its mating cover are produced simultaneously. Built by Plymouth Die Mold, Inc., the molding machine can handle a maximum of 700 oz. (approximately 43 lb.) of material per shot and exerts a 1400-ton clamping pressure. A still larger unit in the Plymouth plant has a 1200-oz. rating and can mold 75-gal. tanks. Molding cycle on the 38-gal. tanks, 18 in. in diameter and 35 in. high, is approximately 2 minutes. Tanks have a 3/16-in. wall which provides good rigidity. Cost is approximately $11.50 each in quantities of 500.

Redmanson Co. recently placed on the market two PE tanks (with removable covers) injection molded by Federal Tool Corp., Chicago, Ill. These tanks, made of low-density PE of medium melt index, are of 20- and 55-gal. size. They will also be made available in rigid PE;

SPECIAL FORMULATION of polyethylene was used by American Agile in fabricating this 100-gal. self-supporting tank for use in stress-cracking environment. Polyethylene-coated steel bands provided additional strength.

POLYPROPYLENE TANK, welded of 3/8-in. sheet stock by American Agile. Tank, 20 by 30 by 42 in. long, with 1-in. flange at top, is self supporting. Drain faucet is also of PP.



Big European tanks made by new process

Although not yet in commercial use in the U. S., the patented Engel process, developed in Germany (world licensing controlled by Vaessen-Schoemaker Holding, N.V., Deventer, Holland), is now being employed by several European companies in producing king-sized PE tanks, bins and related items. It involves relatively low mold costs and is said to offer important production economies. As is the case with many U. S. firms, details of the process are held in strict confidence. Essentially, the Engel process is a type of sinter molding operation. The polyethylene is placed in powder form against the mold walls; heat transmitted through the mold walls then fuses the material into its final shape. Advantages of the system are that it involves low tooling cost and permits a variety of shapes, both cylindrical and square.

Using this technique, Rosedale Associated Manufacturers Ltd., at its Cinderford Works in Gloucestershire, England, is turning out a line of PE tanks, trays, containers and drums ranging from 5 to 200-gal. capacity. In the United Kingdom, the Bowater-Eburite group, under license from Rosedale, are developing and manufacturing a range of polyethylene drums as inner containers and liners for use in fibre drums. Among the items being made by Rosedale, illustrated herewith, are a 60-gal tank, 36 by 24 by 24 in., used with an exterior wire frame support (photo above), and a 20-gal. container (below) which has a round cross section at the base and flares to a rectangular section. Rosedale Plastics International, Ltd., Toronto, is now installing the Engel process and will be in production later this year with a large range of tanks, containers and other units, including drum liners.

average wall section of both tanks is approximately 0.100 inch. Redmanson is also distributing a 31-gal. tank which Federal Tool produces for Culligan, Inc., manufacturers of water conditioning equipment.

Cost of these tanks is approximately one-third that of stainless steel drums.

The containers are injection molded on 200- or 300-oz. HPM machines equipped with preplasticators and recently installed in Federal's plant. The mold which produces the 55-gal. tank weighs approximately 10 tons.

Sheet fabrication: *American Agile Corp.* employs hot gas welding in fabricating a large variety of PE and polypropylene containers and tanks from sheet stock. (For range of sizes see table on page 90.)

The big advantage of sheet fabrication is the practically limitless variety of dimensions and wall thicknesses possible. It permits custom-designing equipment to meet the need of any installation. For example a 100-gal. natural PE tank, used in extraction of rare metals, is 36 in. in diameter with an inside depth of 24 inches. Of all welded construction, it has a thickness of ½ in. on bottom and sidewalls and is fitted with two 1-in. flanged nipples for connection to existing solution lines. Another measures 42 by 26¾ in. in diameter; another measures 12 by 12 by 12; and almost any other size is easily produced.

Heil Process Equipment Corp. also fabricates its polyethylene tanks from sheet stock. A typical tank made by Heil, used to hold a combination of nitric and sulphuric acid, measures 4 by 2 by 2 ft., and is equipped with a plastic coated steel girth.

Forming and welding: Thermoforming, plus electronic welding, is the method used by *Premier Plastics Corp.* Their containers are made of high-density material on a production basis and are used largely as brine tanks in the water conditioning industry. Low tooling cost is, of course, an important advantage for this method.

In fabricating the linear PE tanks, Premier first produces a seamed cylinder for the sidewall and adds to it a thermoformed bottom which is welded into place. Tests made by Phillips Chemical Co. laboratories reveal the tensile strength of the welded section to be approximately 75% of the normal sheet section; for example, 3400 p.s.i. for the welded sheet as against 4480 p.s.i. for an unwelded sheet of the same thickness. Production speed, although not stated, is said to be "infinitely faster" than

is possible with current methods of gas or electric hand-welding.

A unique application of polyethylene to large-volume packages is the Cubitainer, produced by *Hedwin Corp.* It is now available in four sizes up to 15 gal. And it is also a cost-saving unit designed for single-trip shipment of both regulated and non-regulated liquids. It has been designed to meet industry standards for shipment of corrosive liquids.

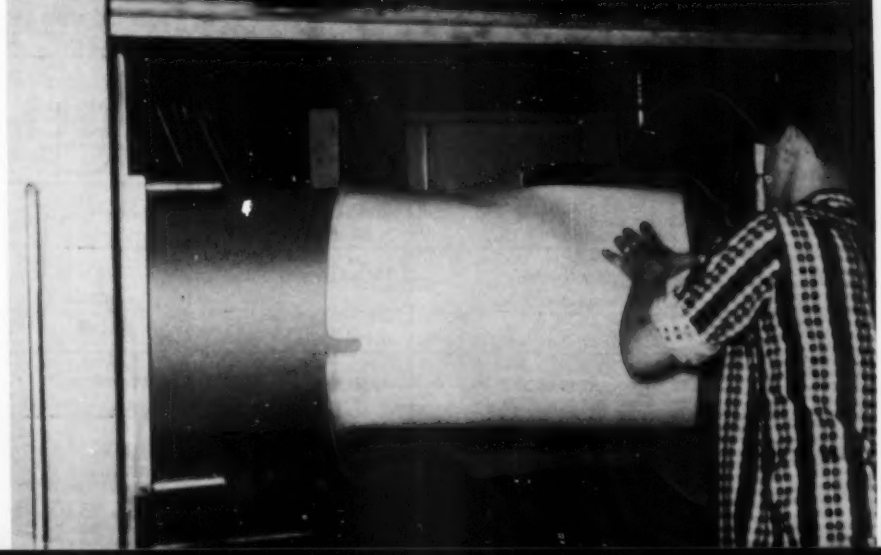
The Cubitainer is a composite package, consisting of a cube-shaped polyethylene insert within a protective wirebound box. Other types of outer packs are also under development. Having an average wall thickness of 30 mils, the Cubitainer is made of virgin PE by a continuous forming and welding operation from extruded sheet by a fully automatic method.

Typical products for which the Cubitainer is particularly suited include bulk chemicals, foodstuffs, sirup concentrates, cosmetics, liquid fertilizers, etc. Hedwin spokesmen state that wide and successful shipping experience under temporary permits from the Bureau of Explosives has proved Cubitainer's ability to handle regulated commodities. The non-regulated items present no problem. This package, available with several types of replaceable cap closures to facilitate filling and emptying, is adaptable to standard filling and handling equipment. It has withstood 4-ft. drop with vibration tests without leakage.

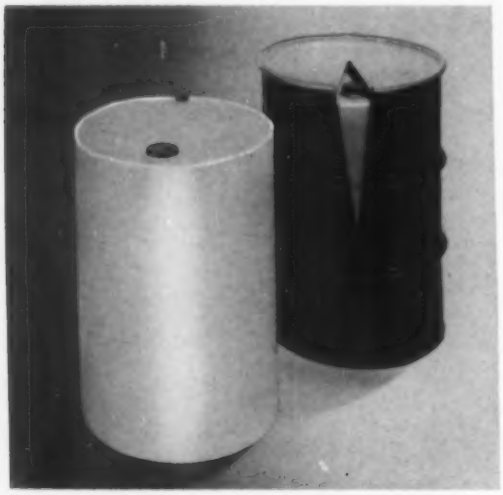
Blow molding: Although most of the blow-molded PE containers produced by *Plax Corp.* fall into the 1-gal. and under category, the com-

PRODUCED by a combination thermoforming and electronic welding process, high-density PE tanks are produced by Premier Plastics in depth to 36 inches. Note seam along wall of containers where sheet has been joined together.

OPERATOR AT FEDERAL TOOL removes 31-gal. container from plug of single cavity mold. Material used is standard polyethylene. Tank will be used in automatic water softening system.



INSERT need not be removed to dispense liquid from Cubitainer.



POLYETHYLENE DRUM, injection-blow molded of high-density material, has 55-gal. capacity. Produced by Delaware Drum & Barrel Co., they weigh two-thirds less than stainless steel drum, even when used with a steel outer shell.

pany also makes other units having an overflow capacity of just under 15 gallons.

Customarily, the Plax containers are used in conjunction with protective outer-packs, including corrugated cartons, steel drums, wire-bound boxes, plywood jackets, wooden boxes or steel wire boxes. The heavy-duty carboy, with a nomir al capacity of 13 gal. and minimum sidewall thickness of 1/16 in., has a net tare weight per container of only 8¾ pounds. A typical application of this container is the C-Mor carboy, available from Seymour & Peck Co., Div. Greif Bros., Cooperage Corp. Here the PE container is enclosed in a rectangular steel rod frame, welded at all points of stress and contact.

Delaware Barrel & Drum Co. employs a combination injection molding-blow-molding technique in producing its drums. They are made in capacities from 5 to 55 gal., in open and closed head styles and in three wall thicknesses. More than 25 styles of closures are available to meet a variety of products, handling and shipping requirements. PE tanks are supplied in sizes from 5 to 500 gal., in over 40 styles and capacities. Both cylindrical and rectangular styles are available. Offering the same basic advantages as the drums, the tanks are widely used in the photographic, chemical, and food processing industries.

Delaware's tanks attain sizable dimensions. A prototype 250-gal. unit displayed at the 1959 AMA Packaging Exposition in Chicago measured 39 in. in diameter and 53 in. tall. Approximate dimensions of a 500-gal. PE tank are 4 ft. diameter by 6 ft. tall. (To page 184)

Major U. S. suppliers of large-capacity PE tanks and containers

Company	*Address*	*Available capacities*	*Production method*
American Agile Corp.	Box 168, Bedford, Ohio	**up to 100 gal. or more on order**	heat welding fabrication
Delaware Barrel & Drum Co., Inc.	Box 1648, Wilmington, Del	**up to 250 gal. or more on order**	injection-blow molding
Hedwin Corp.	1600 Roland Heights Ave., Baltimore 11, Md	**15 gal. (Cubitainer)**	thermoforming and sealing
Heil Process Equipment Corp.	12901 Elmwood Ave., Cleveland 11, Ohio	**up to 100 gal. or more on order**	heat welding fabrication
Plymouth Industrial Products, Inc.	502 Indiana Ave., Sheboygan, Wis.	**30 and 38 gal.**	modified injection molding
Plax Corp.	Box 1019, Hartford, Conn	**15 gal.**	blow-molding
Premier Plastics Corp.	204 W. Washington St., Milwaukee 4, Wis.	**up to 40 gal.**	electronic welding fabrication
Redmanson Co.	630 Loucks Mill Rd., York, Pa.	**20, 31 & 55 gal.**	injection molding

INVITING DECOR of modern alley is brought about by skillful design in reinforced plastics and styrene that combines functionality and beauty. Close-up at right shows details of new pieces. Triangular scoreboards in rear are shown close up in photo on page 93.

APPEARANCE REVOLUTION for bowling centers is sparked by smart look of new accessories. Lazy Susan-type ball return, fabricated of reinforced plastics components, represents radical departure from conventional style. Scoring table, integral with ball return, as well as curved spectator benches in foreground, are made of same material. All are lay-up molded. Chairs in front of scoring table are made of RP in matched metal molds. Note back inserts in spectator bench for added rigidity.

Bowling gets new look for more business

Emporiums turn to reinforced plastics to capture their share of bowling population expected to reach 35 million fans within five years

Increased sales of its bowling alley package are anticipated by AMF Pinspotters, Inc., New York, N. Y., as a result of a complete redesign of bowling center furnishings in reinforced polyester and polystyrene. Involved are ball returns, scoring tables, seating, and light-up triangular scoreboard.

Immediate cost was not a deciding factor in this application. In fact, the plastics components are about twice as expensive as the original wooden parts. But from the long term outlook the switch is a profitable one. The new design, done by Henry Dreyfuss, New York, N. Y., gives a complete fresh look to bowling emporiums, which operators are finding is increas-

HOW BALL RETURN HOOD IS PRODUCED AT D.E.K. MFG. CO.

1—GEL COAT IS APPLIED TO MOLD

2—FIBROUS GLASS MAT IS LAID UP AND TRIMMED

ing their business significantly. According to a spokesman from AMF Pinspotters, Inc., "the advantages of switching to reinforced plastics were better appearance and design, ease of maintenance, and most important, better selection of colors."

What is the market?

The stakes in this game come pretty high. There are today close to 100,000 lanes in this country, representing approximately 5000 centers costing $1 to $2 million each. Each center has around 300 to 400 seats, and a scoring table and ball return for each two lanes. What is more significant still is the fact that today's bowling population of 22 million may reach 35 million by the mid-60's; and that means a lot of new lanes.

To date, AMF Pinspotters has equipped about 42,000 lanes. Current production of the redesigned pieces is for more than 12,000 lanes per year. Cost per typical lane is approximately $5000.

The accompanying photos show the new units and how they are produced. The spectator seats are produced by matched metal molding, all other reinforced plastics units are produced by hand layup.

Custom molders involved in this operation are Cincinnati Milling Co., Cincinnati, Ohio; D.E.K. Mfg. Co., Royal Hill, Ohio; and Molded Fiber Glass Co., Ashtabula, Ohio. The triangular scoreboard, which is formed of impact styrene, is produced by Vacuum Plastics Corp., Columbus, Ohio.

Glass (chopped, mat, woven roving, and wicks) is supplied by Owens-Corning Fiberglas Corp. and Farrel Glass Co. Fire-retardant polyester resin is by Interchemical Corp., Cincinnati, Ohio.

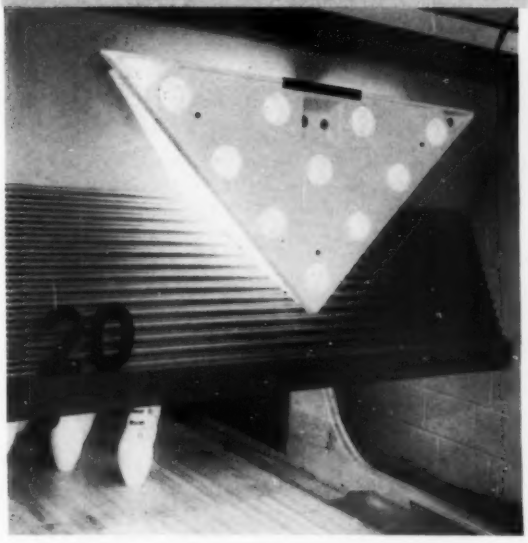
According to Henry Dreyfuss, it was only through going to reinforced plastics and styrene that the new bowling alley concept—a setting for human beings rather than merely a collection of mechanical devices—was translatable in a new design. These new design concepts are giving a strong boost to the nation's interest in bowling.—**End**

3—PVA BAG IS CLAMPED TO IMPREGNATED LAYUP

4—FULLY CURED HOOD IS REMOVED FROM MOLD

5—FLASH IS TRIMMED OFF FINISHED UNIT

VACUUM FORMED STYRENE SHEET in triangular scoreboard (shown covered with perforated metal at right), gives exciting look to business end of alley, eliminates confused tangle of wires prevalent in older scoreboard models.



For better garden tools—

The success of three molded Marlex components in the new ultra-modern Toro lawn mower has greatly boosted the stock of high-density polyethylene in the eyes of design engineers. The reason: it represents proof of the suitability of the material for major structural components in machine housings.

The application was the result of a three-part cooperative effort between Toro Mfg. Corp., Minneapolis, Minn., manufacturers of the mower; Phillips Chemical Co., who supplied the polyethylene; and Flambeau Plastics Corp., Baraboo, Wis., the molder.

The lawn mower manufacturer felt that plastics might be more practical and more economical in meeting the special construction requirements and complicated configurations set up by its new concept of "wind tunnel" mowing. Basic to this concept is the installation of a full-circle expanding tunnel under the housing. The vacuum thus created "freezes" the blades of grass upright for a clean cut, and clean-sweeps the lawn in much the same fashion as a vacuum cleaner would work on a rug. Compressed air then blows the clippings and leaves into a bagging attachment for easy removal.

How PE parts function

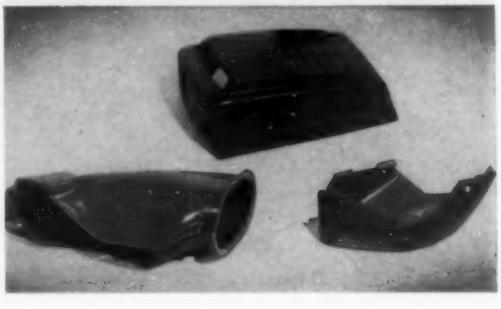
The three lawn mower parts involved are the engine shroud; the discharge chute, which carries objects picked up by the vacuuming action into the bagging attachment; and an adjustable side deflector located over the discharge chute, which angles clippings and other materials toward the ground and away from the operator.

In each case the use of polyethylene contributes major functional advantages. In the engine shroud, the material serves as insulation to prevent accidental burns; because it is shock resistant it protects the engine from damage. Its rigidity keeps the engine from litter, branches, or other shrubbery; and, of course, it will not discolor from gas, oil, or heat. In the discharge chute and the deflector, the high-density polyethylene was put to use because of its ability to absorb the shock of the discharged material, because it could be molded into the complex shapes required, and because of its resistance to horticultural chemicals.

Over-all, the design potential inherent in polyethylene made it possible (To page 186)

RADICAL lawn mower design based on functional new concept of "wind tunnel" mowing dictated switch to tough, resilient, and lightweight molded high-density polyethylene for major components. One such component, the discharge chute, is shown being attached.

THREE BASIC PARTS now being made of polyethylene include: the one-piece engine shroud (top); the discharge chute (left) which is stapled together and easily attached to the mower; and the discharge deflector (right) with molded-in integral hinge to facilitate assembly.

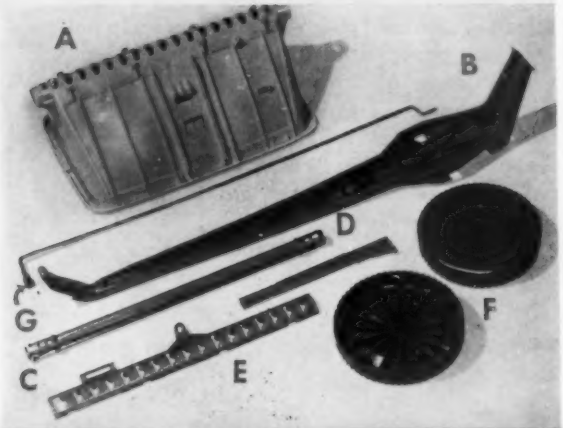


high-density polyethylene

VIGORO SPREADER

LAWN CARE is made easier and less expensive with a fertilizer spreader produced from parts injection molded of high-density polyethylene. Hopper holds 25 lb. of lawn food.

LINEAR POLYETHYLENE components of the spreader include (A) the intricately cored hopper, inverted in this view to show feed slots and reinforcing ribs; (B) handle, measuring 36 in. long; (C) combination axle and agitator shaft; (D) adjustment bar; (E) flow plate; (F) wheels; and (G) button cap for metal control rod. The wheels, designed with 16 radial reinforcing ribs, are keyed to lock in position when snapped over flexible fingers at ends of axle.



Eight injection molded Grex high-density polyethylene components make up a lawn plant food spreader that costs half as much as metal spreaders, weighs one-fourth, is corrosionproof, and is sturdily built for years of trouble-free service. The unit was developed and is produced for Swift & Co. by Federal Tool Corp., Chicago, Ill. Functional styling of the unit was handled by Reinecke & Associates, industrial design firm, Chicago.

Swift is using the new spreader in conjunction with its intensive 1959 merchandising program for Golden Vigoro non-burning plant food. Designed to hold up to 25 lb. of fertilizer, the spreader is offered at a suggested retail price of $7.95.

Advantages over metal units

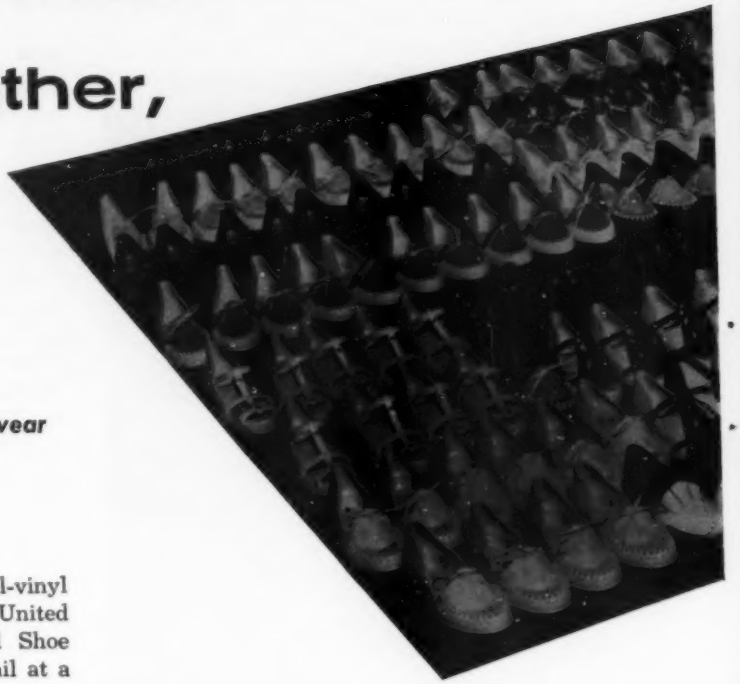
By molding the spreader of polyethylene, costly metal forming, stamping, finishing and assembly operations were eliminated, producing a finished unit well below the price most home-owners would expect to pay for such a garden tool. The spreader is so light—less than 4 lb.—that it can be conveniently hung up, like a rake, when not in use. Its light weight also makes it easy to operate.

Plant food is dispensed through slots molded into the bottom of the hopper at a rate adjustable by a fingertip control. The 1⅜-in. wide molded wheels, reinforced by 16 radial ribs on the inner surface, will not dig into lawns. No maintenance or oiling are necessary.

All but three components—a washer, a cotter pin, and an aluminum control rod—are molded of linear polyethylene. Total weight is slightly more than 3 pounds. The parts include the bright yellow hopper (18½ by 12½ by 7 in. deep); two 8-in. diameter red wheels; a 36-in. long handle, with reinforcing ribs on lower side; the axle, which also serves as an agitator shaft to dispense plant food through the hopper outlets; a flow plate, a flow adjustment bar, and a small button which caps the end of the metal control rod.

The hopper, weighing approximately 21 oz. and involving complex coring and side actions in the mold, is produced in a single-cavity mold run on a recently installed 200-oz. HPM preplasticator-equipped injection machine. Smaller machines produce the remaining parts.—End

All-vinyl footwear outlasts leather, costs less



Produced from injection molded and fabricated sheet components, new children's shoes offer increased wear at a fraction of the usual price

Price is the big point for a line of all-vinyl children's shoes being introduced in the United States this month by Intercontinental Shoe Corp., New York, N. Y.: they will retail at a low $2 to $4 a pair, compared with an average of $8 for conventional footwear. Despite the low tag, the shoes are claimed to outwear leather types ten to one.

What makes low price possible?

Credit for the low cost goes to significant savings in both materials and labor. Recent quotations for unprocessed hide are running at about 33¢/lb.—and are heading up. Domestic vinyl is listed at 23.5¢/lb.—and is not expected to follow this trend. In terms of labor cost, about 180 separate operations are involved in producing a conventional shoe; only 8 to 11 are necessary for the new designs. While some of these savings are cancelled out by tool cost (which the traditional shoe manufacturer does not have to bear), they are still significant enough to permit the shoes to be sold at the low retail figure.

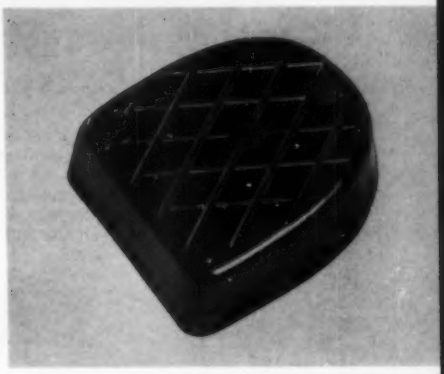
OPERATOR REMOVES shoe base from single cavity injection mold. Base constitutes about 80% of shoe by weight.

How they are made

Sole, heel, and side vamps are injection molded in one piece by Southern Plastics Engineering Corp., Greensboro, N. C., using single-cavity molds run on 6/8-oz. Reed-Prentice machines. Production rate is 1080 shoes per machine per 24-hr. day. The heel of the shoes is produced hollow and is later filled with an injection molded "plug"—also a relatively hollow unit made firm by vertical reinforcing ribs. Purpose of this construction is to keep weight down. At present, the basic injection molded component weighs 0.62 lb. per pair; this accounts for roughly 80% of total shoe weight and is comparable to standard leather shoes now on the market.

Twelve molds have been tooled, turning out

WIDE VARIETY of styles, including two-tone designs, are available in all-vinyl shoe. Base, heel, and side vamps are injection molded in one piece. Uppers are attached separately.



INJECTION MOLDED "PLUG," closed at one end and open at the other, is made rigid by carefully designed ribs. Plug fits into hollow heel, helps keep weight of shoe down.

six sizes (12, 13, 1, 2, 3, 4) for the 5-to-11 age group.

The molds are made in the United States from modified lasts by a Kellering process. Original lasts are built up selectively to discount the various degrees of mold shrinkage resulting from variations in shoe wall thickness. Tooling cost is $7000 per pair of molds.

Assembly

The molded components are shipped to the Winchester, Tenn., plant of ICS, where the uppers have been die cut from vinyl sheet. Assembly of the upper and lower components is by heat sealing, brads, and lacing, as well as by hand stitching.

Because they are made up of two parts, the shoes can be produced in two-tone design, something not possible with molded one-piece footwear. High-pressure injection molding permits thinner walls—and consequently lower weight—than the extrusion-injection process used in making one-piece shoes.

Resin from which the new line is molded is a plasticized polyvinyl chloride specially formulated by Union Carbide Plastics Co., and which has been designated Vinylteen by ICS. The shoes themselves are sold under the tradename of Orbits.

Markets and prospects

Initial estimates by ICS place annual sales at around 5 million pairs, which is approximately 10% of the total annual children's shoe market. This figure can be expected to grow over the years as leather shoes go up in price and improved vinyl formulations are developed. Although originally developed as sun-and-fun shoes, improvements in formulation have resulted in a product that is practically a year-around item. As a matter of fact, ICS is already busily engaged readying back-to-school and fall lines. With the new formulations, sales are expected to zoom. For in addition to price and wear, the shoe is also non-scuffing, needs no shine, will not stretch or go out of shape, has skidproof soles, and has counters that cannot be permanently squashed.—End

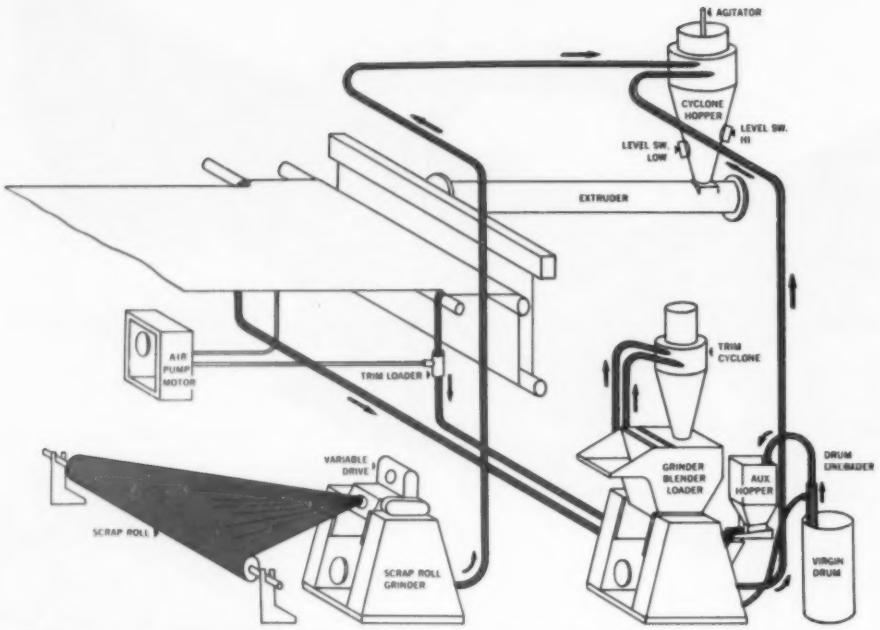


FIG. 1: Automatic scrap-handling layout for extruded film plant. Scrap path is shown in color. Trim scrap is blown from the roll stand to regrinder, where it is ground and blended with virgin (and, if desired, with preground roll scrap). In scheme shown here, roll scrap is ground and fed directly to extruder hopper, where it is mixed in with feed from grinder/blender/loader. Variable-speed drive on the roll-scrap grinder permits exact adjustment of feed ratio.

How to cut scrap

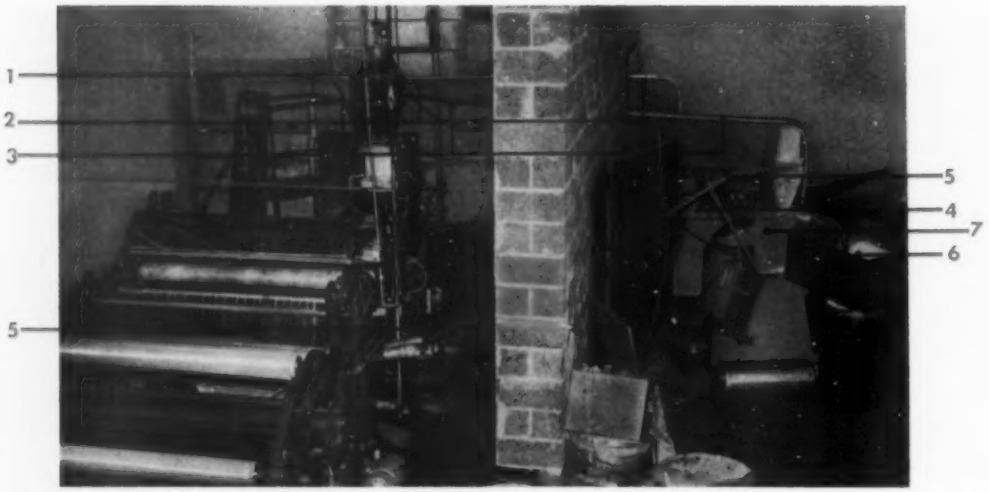


FIG. 2: Photo showing automatic recycling of polyethylene film scrap. 1) extruder hopper; 2) pipe returning ground roll scrap to extruder hopper; 3) pipe returning blended virgin and trim scrap to extruder hopper; 4) roll-scrap grinder; 5) film trim passing from winding stand to grinder/blender/loader; 6) hopper containing previously reground roll scrap; and 7) grinder/blender/loader.

Incorporation of automatic scrap-handling equipment in molding or extrusion plants can save processor thousands of dollars a year

By Robert Shevett*

losses

In almost all plastic manufacturing operations, a certain amount of waste is continually produced as a by-product of the finished article. Not to be confused with purgings, start-up scrap, etc., this scrap appears as sprues and runners in injection molding and as edge trim in all sheet extrusion operations; in blown film extrusion it is off-gage material in the form of scrap rolls.

In injection molding operations, the scrap is generally ground in beside-the-press grinders and later tumbled and mixed with virgin material. This creates additional handling on the part of the molder, with the ever-present danger of contamination; and quite often the molder finds that he has finished a run of a particular color or material and has been left with several hundred pounds of good scrap which cannot be used because the run is finished. The ground scrap must either be stored, thereby using valuable factory space, or be sold to a reprocessor at a considerable loss to the company.

In extrusion operations producing sheeting, flat film, and blown film, the problem is even more acute. Because of the high output of most extrusion operations, just the physical problem of handling storage is an extremely difficult one, since the scrap cannot be ground as it is produced. Also, until recently, it was impossible to put the scrap back into the extruder

* Sales Engineer, The Rainville Co., Inc.

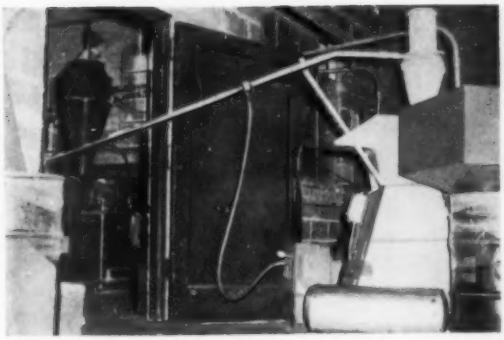


FIG. 3: Closer view of right-hand half of Fig. 2, showing film trim feeding into regrinder, with extruder hopper in left background.

FIG. 5: Close-up of roll-scrap grinder in operation. Pipe rising from behind Reeves drive delivers product to the extruder hopper.

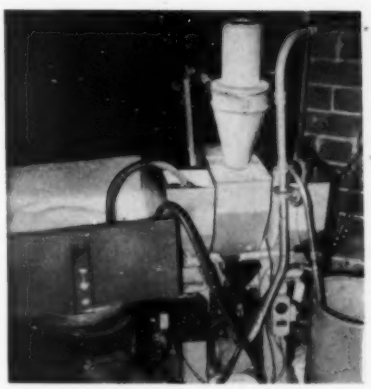


FIG. 4: Close-up of regrinder/blender/loader, heart of automatic scrap recycling system. Preground roll scrap in large hopper at left is pneumatically lifted into vibrating-feeder hopper, where it is dropped into blender along with virgin feed from drum at lower right. Both feeder hoppers can be kept warm with dry, hot air. Pipe emerging from bottom of blender and leaving picture at upper right delivers blend to extruder hopper.

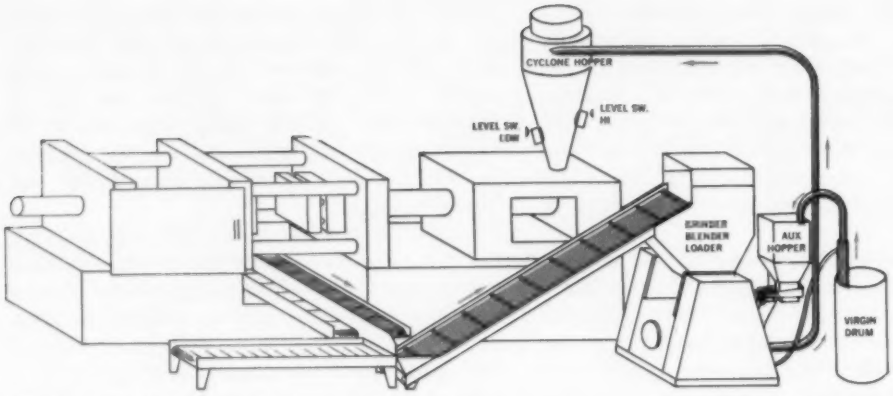


FIG. 6: Schematic diagram of automatic sprue- and runner-scrap recovery in injection molding plant. Flow of recycled material is shown in color. Finished moldings are separated from runners and sprues by ejection mechanism; moldings move to left along conveyor for packing, while still-hot sprue and runners are conveyed to grinder/blender/loader, ground, mixed with virgin compound (all kept dry and warm by hot air), and returned to molding machine hopper.

unless, of course, it had been repelletized, because of the extremely low bulk density of most film scrap.

What is the cost of waste?

Since these problems are common to the industry, the costs have until now been lumped together with overhead and dismissed as a necessary evil. However, a closer examination shows that over a period of time they can become quite considerable and, in some cases, can mean the difference between a successful operation and a marginal or losing one. For the molder who through careful planning manages to use all his scrap on a particular job, the cost of handling, emptying his grinder bins, storing, tumbling, etc., runs to about 2¢/lb. Since it is obviously not possible to plan every job this way, it is a rare molding plant which does not accumulate several thousand pounds of scrap per year which is usually sold to a scrap dealer at a loss of anywhere from 6¢ to 10¢/lb.

In sheet and film operations, the average scrap figure on a percentage basis amounts to somewhere around 5% of the total output. Because of problems of bulk density and contamination, most film extruders decide against using their scrap; it is either sold to a scrap dealer for a 10¢ or 15¢ loss or repelletized at a cost of somewhere around 6¢/lb. To show the amount of money involved here, let us take the case of a film extruder with four 3½-in. extruders, each delivering around 200 lb./hr. Using an extremely low scrap value of 2½% of total output, the scrap will amount to about 500 lb. per day, or 100,000 lb. per year on a 24-hr. basis, 200 days per year. Repelletizing this material costs $6000 per year, plus at least another $6000 in indirect costs, such as handling, etc., while selling it outright to a scrap dealer would cost this manufacturer at least $15,000 per year.

There is a way to cut these sizable losses. The most direct way to remove the scrap problem is to eliminate it completely and re-use the scrap as it is produced. This can be done on a continuous and automatic basis and often the costs involved will be more than amortized in most operations within a year.

How to use extrusion waste

Figure 1, p. 98, shows the flat film operation set up for automatic scrap handling. The edge trim is picked up by a pair of trim loaders, one mounted at each slitting knife. These loaders, operated from a separate spare pump, convey the trim to a small cyclone hopper on the grinder from which it drops into the grinder itself. In the case of rigid sheeting which cannot be handled by the air loading system, the edge trim would be pulled into the grinder by a set of powered feed rollers which are equipped with variable speed drive. In either case, once the trim is in the grinder, the operation of the over-all system is similar to that used in the molding operation. The ground scrap is mixed with virgin material and delivered back into the extruder hopper. Note that at no time is there (To page 188)

The URETHANES grow up—Part 3*

What are the new and versatile urethane elastomers and coatings?

How can you use them for profit? Here are the case histories that spell it out

Urethane elastomers, molding materials, potting compounds, and coatings are still in their infancy in this country, but applications already established indicate new volume-areas of products and profits. This article is a report on these developments.

Cast urethane elastomers

These materials, which fill the gap between rubber and steel from the point of view of properties and applications, can be converted from a liquid into finished products by most of the plastics processing techniques, of which casting is the most important; compression, transfer, injection and rotational molding are also used. Only slight modifications of standard equipment are required.

Casting is most suitable for making large items in single cavities. Inexpensive molds may be used, and the process is easily automated. Machines for handling liquid epoxy resins, such as those supplied by Automatic Process Control Co., Union, N. J., and by Mitchell Specialty Div., Industrial Enterprises, Inc., Philadelphia, Pa., can be used with slight modifications for casting the liquid urethane. Blueprints for suitable machines are also available from Du Pont and Mobay Chemical Co., but Mobay confines its technical assistance to licensees.

How are they used? The majority of applica-

*Part 1, dealing with cushioning, appeared in March MP1, p. 91; Part 2, covering rigid foams and the structure of the foam industry, was published in April MP1, p. 109. This is the concluding article in the series.

Photo, Cargill, Inc.

FLEXIBILITY of urethane-based coating (right) gives higher impact resistance than easily splintered commercial film (left), which is knocked loose, leaving base surfaces susceptible to corrosion and other damage.

HIGH-IMPACT DRAG LOADS are imposed on urethane tail wheel as first part of plane to touch runway in normal field landings of Douglas F4D aircraft. Disogrin's urethane wheel proved four to five times more wear-resistant than rubber, and withstood 33 arrested landings and 49 field landings in tests, before a small chunk was knocked off. After a total of 140 landings, only $\frac{3}{16}$ in. of urethane had been worn off the outer periphery of the wheel.

Photo, Allied Chemical Corp.

CAST URETHANE elastomers, used for spur gears, screws, nuts, and other engineering applications, are easily machined.

tions for these elastomers stem from the unusual combination of properties that can be obtained. This versatility also demands new design concepts, since urethane is not just a replacement for rubber, steel, or structural plastics, but consists of an entirely new class of materials.

Growth for urethane elastomers is, therefore, dependent on the willingness of end users to use their skill and imagination in order to take advantage of the experience that has been gained in producing the variety of products which are already on the market.

Urethane elastomers combine a wide range of hardness with elasticity. Recent advances by Du Pont, Mobay, and Allied Chemical indicate that in performance and cost for a number of applications, these "elasto-plastics" (as Du Pont calls its new LD-213 liquid urethane elastomer) are a strong challenger to nylon.

The elastomers have excellent shock absorbing powers and vibration dampening properties, and are used for mallet heads, machine pads, suspension bearings on heavy earthmoving equipment, seats for mud pumps, and similar heavy-duty uses. Flexible coupling connector disks of this material permit up to 0.040 in. linear, and 12° angular misalignment without malfunction problems.

The exceptional abrasion resistance of urethanes is useful for solid tires for industrial trucks and materials handling equipment where they support higher loads, outwear other tires, and reduce power consumption by as much as 50% because less energy is absorbed by the flexing of the tires. Other uses include lining for the sheaves of cable cars, friction wheels and drives, drive belts, and linings for pump housings. In one pump application involving a kaolin slurry, a cast iron housing had to be replaced after each 350 hr. of operation, while a urethane housing was still operating satisfactorily after 3000 hr. on the same job.

Urethane elastomers also resist most oils, automotive and aircraft fuels, and are used for gaskets, where the low compression set of these materials is also an advantage. Cylinders with steel casings and wipers on oil well drilling equipment are other typical uses. These materials can also be modified with additives to make them self-lubricating.

Who supplies what? Isocyanates, the basic

chemicals for all types of urethanes from foam to coatings, are supplied by Mobay Chemical Co., Du Pont, Allied Chemical, Naugatuck Chemical Div. of U. S. Rubber, and for specialty uses, by The Carwin Co.

Prepolymers for urethane elastomers from Du Pont, Mobay, Thiokol Chemical Corp., and Naugatuck Chemical are now on the market. However, there is tremendous research and development activity by many companies in the rubber industry and in other fields. Whether this will result in more suppliers of the basic elastomers chemicals or whether these companies will concentrate on making urethane elastomer products, is not clear at this time. Major manufacturers of urethane elastomer products include Disogrin Industries, Inc.; Acushnet Process Co.; Dayton Rubber Co., and its subsidiary, American Latex Co.; The Ohio Rubber Co.; and Nichols Engineering Co.

Consumption of cast urethane elastomers is expected to run to 750,000 lb. in 1959, with 2 to 4 million lb. in 1960 anticipated.

Molding materials

A thermoplastic elastomer, called Estane VC, has been developed by B. F. Goodrich Chemical Co. It is available in tough, rubbery granules, which are converted into end products by milling, calendering, extrusion, or molding. According to the company it has a high degree of solvent resistance and rubber-like elasticity. These properties are characteristic of vulcanized systems, and the designation "VC" was originally conferred to indicate "virtually crosslinked." Estane VC is actually not a crosslinked polymer, however. First major applications are expected in wire and cable jacketing;

NO APPRECIABLE WEAR is shown by urethane wheel after 18 months of use on straddle trucks used in New York City warehouse of F. W. Woolworth & Co. (below). Swivelling action and heavy loads cause tearing. In photo above, urethane wheel (center) is still usable after 8 months. Canvas wheel (left) lasted less than a month, and rubber wheel (right) less than three.

Photos, Disogrin Industries, Inc.

Photo, Mobay Chemical Co.

COMPLICATED SHAPES are no problem for cast urethane elastomers. Flexibility of materials makes possible undercuts, projections, slots, and tapers on a mass production basis.

other potential uses include fuel hose, belting, coated fabrics, engine mounts, etc. The current price for Estane VC is $1.85/lb. A series of linear urethane molding materials of high molecular weight is produced by Bayer in Germany for specialty mechanical uses. It can be extruded as well as injection and compression molded.

Potting compounds

Liquid elastomers (such as Thiokol's Solithane 113, Du Pont's Adiprene L, and Allied Chemical's DC potting compounds) alone, or in combination with epoxy resins, have proved useful in encapsulating of electronic parts. One of the great advantages of using a straight urethane formulation is that the compound can be patched so that components can be repaired without difficulty. With some other potting compounds, expensive embedments had to be thrown away because it was impossible to patch. Epoxies have the disadvantage of generating a greater heat of reaction, which, of course, limits the volume for which they can be used easily.

The excellent impact absorbing properties of urethane potting compounds are exemplified by a test conducted by Thiokol where a .38 caliber bullet was fired from a distance of 22 ft. into an encapsulated part formed in a quart Mason jar. The bullet was stopped within 2-in. and the encapsulated part remained unaffected. The use of these materials depends on their cost in relation to the encapsulated part. A typical example is an electronics assembly occupying 18 by 12 by ¼ in. and costing several thousand dollars, which is protected by a ¼-in. thick urethane coating on both sides and costs approximately $4.

Millable gums

These urethane elastomers are generally processed on rubber equipment. They are intended for applications where maximum service for a given expenditure justifies a high material cost in the elastomers field. Du Pont, Naugatuck Chemical, and several leading rubber companies are active in this field; and Mobay is expected to announce availability of such materials in the near future.

Coatings

The impressive line-up of properties combined in the urethane coatings have led to significant and profitable uses on wire, wood, concrete, rubber, leather, textiles, metal, urethane foam, and paper. These properties include exceptionally good resistance to abrasion and solvent attack, high gloss retention, flexibility and resultant impact resistance, excellent adhesion, good electrical resistance, and good weatherability. Urethane coatings can be applied by dip, spray, or brush. They can be pigmented. A wide variety of formulations, (To page 199)

BRIGHT URETHANE coating on expansion tank (right) is unaffected by weathering action, corrosive gases, and salt spray at San Diego, Calif., sewage treatment plant. Painted pipe (foreground) is badly corroded under these conditions.

Photos, Poly-Form Mfg. Co.

SUPERIOR CORROSIVE RESISTANCE of 100% urethane coating on floor plate grating (foreground) over asphalt paint (at rear) is shown after six months' use. Plates fit over raw sewage junction box.

Truck payload up

with RP tanks produced by new centrifugal molding method

Easing the cost/profit squeeze in the truck transport industry seems to be a job particularly well-suited to reinforced plastics materials —first in truck cabs and bodies and now in fuel, air brake, and air starter tanks. By reducing equipment weight some 250 lb. in a typical Diesel truck, and by proportionately increasing payload capacity—the profit backbone of the industry—the centrifugally molded polyester-glass tanks have chalked up a significant advance as a replacement for steel.

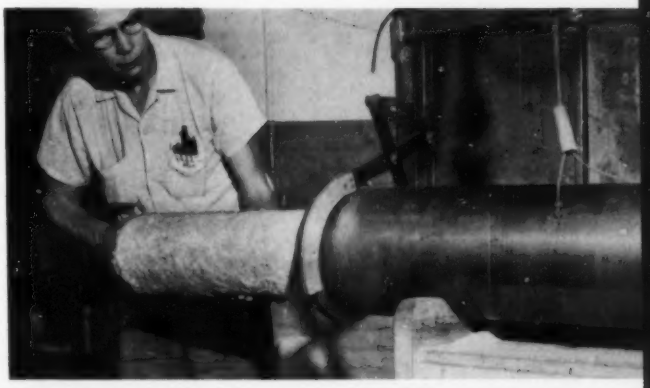
Although the original cost of the plastic tanks is slightly higher than that of their steel counterparts, the functional advantages are such as to completely swing the scales in their favor. As designed and molded by Apex Reinforced Plastics, division of White Sewing Machine Corp., Cleveland, Ohio, the polyester-glass tanks are, of course, lighter in weight, resilient enough so that they will not dent or rupture under shock, require no maintenance whatever, are corrosion resistant, and have a permanent molded-in color. By using Hetron 31A polyester resin (Hooker Chemical Corp.), Apex has added fire resistance to the tanks.

The tanks are so designed that they can be installed on existing trucks without any retooling or redesign necessary. In this way, Apex feels that the market prospects for the tanks are twofold: as replacements for the steel tanks in the trucks already on the road, and as original equipment for the 150,000 new transport trucks produced annually.

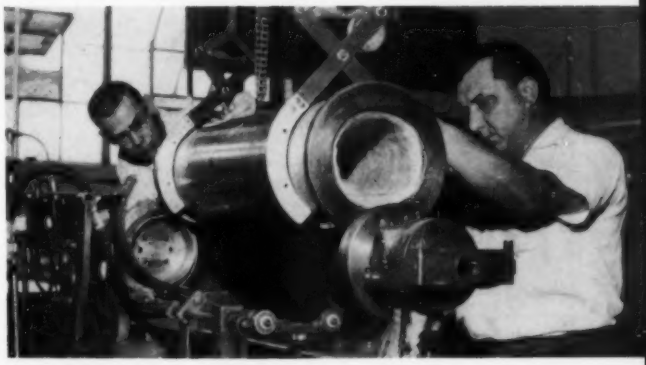
How they are produced

The tanks are produced by a centrifugal molding process—a technique with which Apex had considerable success in turning out tube assemblies for torpedo launchers. This technique assures uniform wall thickness and eliminates longitudinal seals.

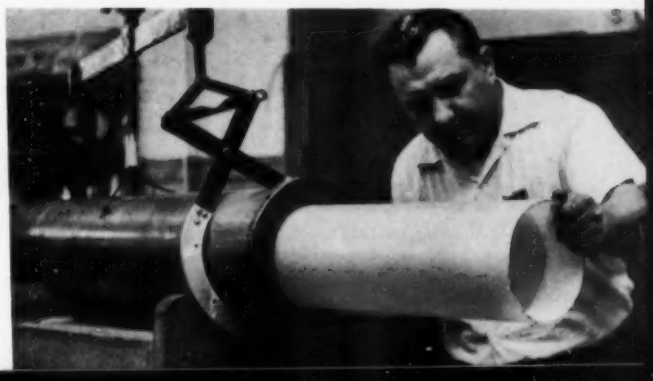
In the mechanized production (To page 204)



IN PROTOTYPE SET-UP for centrifugally molding polyester-glass tanks, fibrous glass mat is wound around cylinder and the assembly then inserted into the heated mandrel.



CYLINDER is then removed and the mandrel, now lined with the fibrous glass mat, is swung into position. Once set up, the mandrel begins spinning as a hollow rod (out of which the polyester resin flows) advances into the center of mandrel. Centrifugal pressure from spinning mandrel forces resin through glass mat.



THE FINISHED TANK, after heat curing, is removed from mandrel. Centrifugal molding process provides uniform wall thickness and eliminates longitudinal seams in the tank body.

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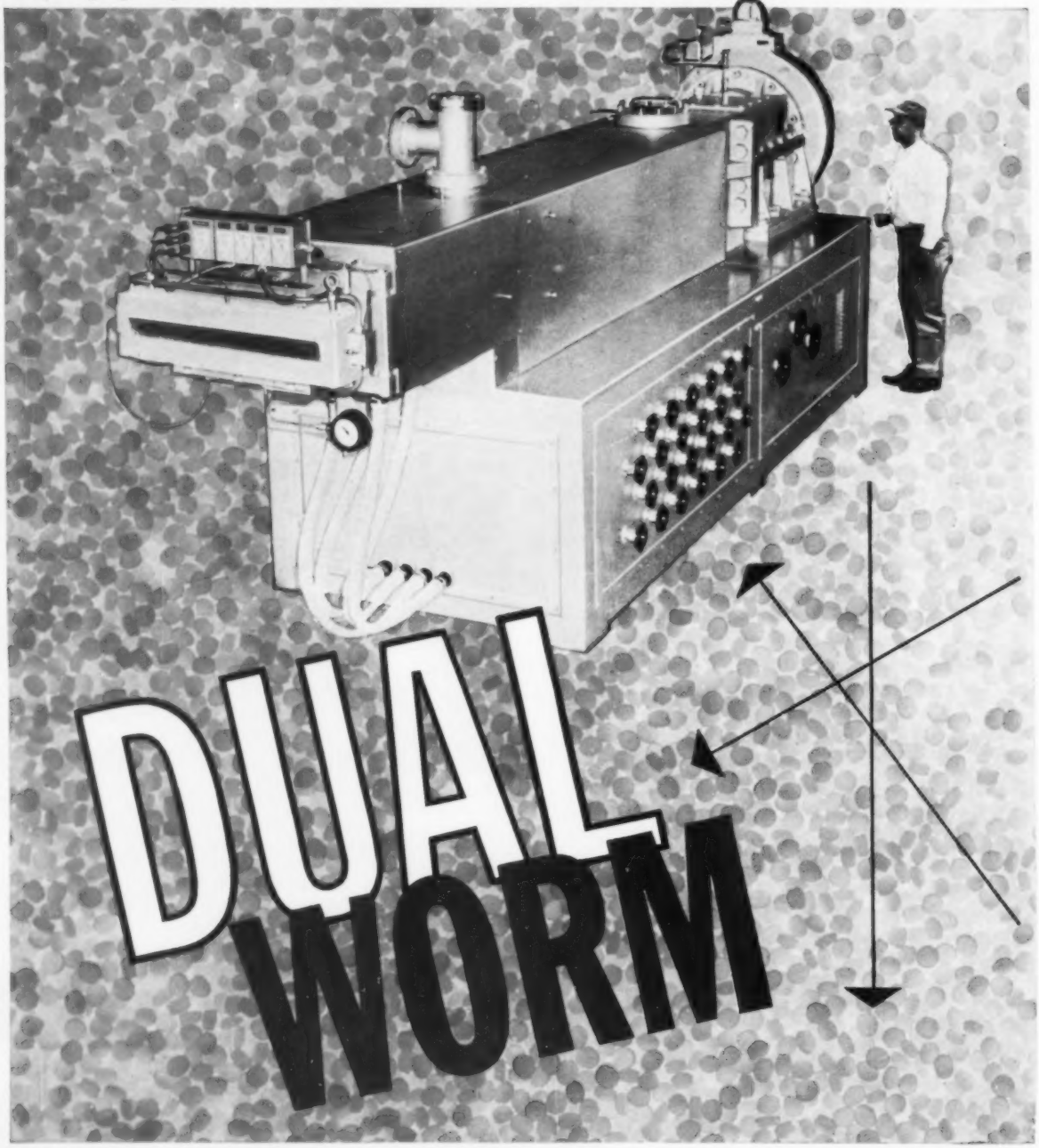

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Sealability of polyethylene films

How can the sealability of PE films be divorced from film thickness and machine factors? This basic study of heat-conductive sealing reveals two mechanisms of sealing, offers sound sealability criteria

By James M. McKelvey† and T. H. Strome‡

This article is a report of investigations which have been made into the nature of the heat-sealing process, especially as applicable to polyethylene film. The results show the role of the various factors affecting the sealing operation and, it is believed, should enable improved testing procedures and specifications for sealable films to be developed.

Apparatus

A Sentinel Model-12A heat sealer with modified platens, shown schematically in Fig. 1, p. 108, was used to make the seals. The upper (movable) platen consists of an aluminum block containing three 250-w. cartridge heaters. A cast-iron plate, 0.25 in. thick, is attached to the bottom of the aluminum block. The stationary lower platen consists of a heavy steel base upon which a 0.25-in. thick pad of silicone rubber rests.

There are two thermocouples in the upper platen. The first, placed in the aluminum block close to the heaters, is connected to a controller. The second, placed in the cast iron plate, is connected to a potentiometer. The upper thermocouple acts as the control element and the lower as the indicating element. With this system the maximum variation in temperature at the indicating element is less than 1° F.

The pressure control and timing devices supplied with the sealer were used. With them the variation in contact time was less than 0.10 sec. and the variation in pressure was less than 1 p.s.i.

Procedure

Seal strengths were measured with an Anthor Type-272 Tester. The elements of this instrument are shown in Fig. 2, p. 108. The free ends of a 1-in.-wide sample are clamped in the jaws. The lower jaw is driven downward at a constant speed of 12 in./min. This causes the sealed area to be "peeled" apart. The force exerted on the sample is indicated by the deflection of the pendulum, as shown in the figure. The strength of the seal is arbitrarily taken as the maximum force indicated by pendulum during the test.

Samples were prepared by making a sandwich of the films between two pieces of 1-mil aluminum foil. This prevents the polyethylene from sticking to the platens of the sealer. To make a seal, the end of the sandwich was clamped between the platens of the sealer for a specified period of time. Upon removal from the sealer the sample was allowed to cool, the foil peeled from the polyethylene, and, unless otherwise specified, the sample immediately tested.

The films used in the sealing experiments are described in Table I, p. 108. The purpose of the first experiment was to determine the precision of the sealing and testing apparatus. Film A was sealed with a contact time of 1 sec., a cylinder pressure of 10 p.s.i. and a platen temperature of 225° F. The seal of strength was determined immediately upon cooling. Holding all operating variables constant, 15 repeated determinations were made. This procedure was repeated for Film B, with the exception that the platen temperature was reduced to 206° F.

The precision can be characterized by the standard deviation, a statistical quantity defined by the equation

$$s = \sqrt{\frac{\Sigma (x - \bar{x})^2}{N - 1}} \qquad \text{Eq. 1}$$

where x represents an individual measurement and $\bar{x}$ is the mean of the set of N measurements.

The results are shown in Fig. 3, p. 108. For Film A the mean seal strength is 600 g. and the standard deviation is 36 grams. For Film B the mean seal strength is 300 g. and s is 30 grams.

The purpose of the second series of experiments was to investigate

* Reg. U.S. Pat. Off.

† Chemical Engineering Dept., Washington University, St. Louis 5, Mo.
‡ Continental Can Co., Flexible Packaging Div., Mount Vernon, Ohio.

the effect of contact time on seal strength. Film C was used. All runs were made with a constant cylinder pressure of 10 p.s.i. Three different platen temperatures were used. The results are shown in Fig. 4, p. 109.

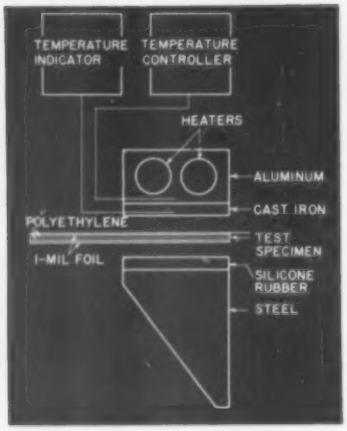

FIG. 1: Schematic diagram of heat sealing apparatus.

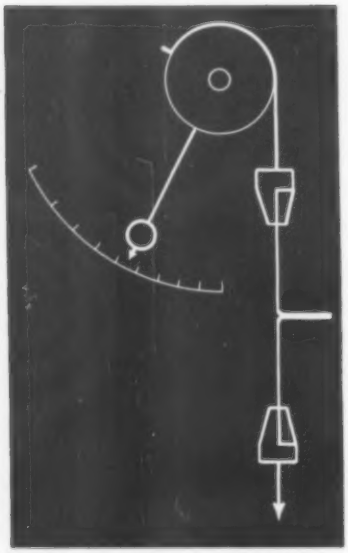

FIG. 2: Schematic diagram of instrument used to measure strength of seals.

In the next series of experiments the effect of pressure at constant contact time and temperature was investigated. The range of pressure was from 2 to 60 p.s.i. Film B was used. The temperature was 225° F. and the contact time was 1 second. The results are shown in Fig. 5, p. 109.

The final series of experiments investigated the effect of platen temperature at constant cylinder pressure and contact time. Films A, B, and C were used. The results are shown in Fig. 6, p. 109.

Analysis of seal-strength data

The fact that seal strength is greater at higher platen temperatures and longer contact times, as Figs. 4 and 6 show, suggests that the temperature at the interface of the two films might be a critical factor in determining seal strength. It would be difficult, if not impossible, to measure accurately the interfacial temperature; however, it is not difficult to calculate. Because the sealed area is many times as wide and long as the films are thick, the flow of heat is essentially one-directional. The differential equation for one-directional heat flow is written

$$\frac{\partial T}{\partial t} = \alpha \frac{\partial^2 T}{\partial x^2} \qquad \text{Eq. 2}$$

where T=temperature, t=time, and α=the thermal diffusivity of the material. The variable x=the distance measured downward from the face of the film in contact with the heated (upper) platen.

The thermal diffusivity of aluminum is about 1000 times that of polyethylene or rubber. Therefore, in the analysis of the heat sealing operation the thermal resistance of aluminum can be neglected in comparison to that of the other materials. Furthermore, polyethylene and rubber have about the same thermal diffusivity, so that they can be treated as a single substance. This reduces the problem to one of conduction of heat into one face of a very thick slab, a so-called "semi-infinite" slab. When the above differential equation is twice integrated to give T in terms of x and t, there are two constants of integration that are evaluated by making them fit the "boundary conditions" of the problem. In this case, one boundary condition is that the film is initially at a uniform low temperature throughout, i.e., at $t = 0$, $T = T_i$ for all x. The other condition is this: the platen temperature, i.e., the temperature of the heated face of the film where $x = 0$, stays constant during the sealing operation. Symbolically, this is stated $T = T_p$ for $x = 0$, for all t.

If the slight variation of α with temperature is neglected, the solution of Eq. 2 satisfying these boundary conditions can be written

$$\frac{T_p - T}{T_p - T_i} = erf\left[\frac{x}{2\sqrt{\alpha_a' t}}\right] \qquad \text{Eq. 3}$$

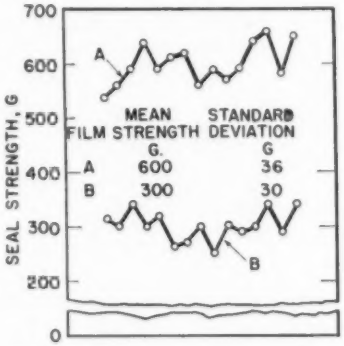

FIG. 3: Fifteen consecutive measurements of seal strength of two films under identical conditions show random variation typical of such measurements. Difference between mean strengths of **A** and **B** is due to electronic pretreatment of **A**.

Table I: Description of films

Film	*Resin*	*Melt index* dg./min.	*Density* g./cc.	*Extrusion temperature* °F.	*Type of film*	*Thickness* mils	*Treatment*
A	Alathon-22	3	0.921	300	Blown	2.7	electronic
B	Alathon-22	3	0.921	300	Blown	2.7	none
C	DFD-3300	3.5	0.919	585	Flat	2.0	none
D	Alathon-16	4	0.923	600	Flat	4.0	none
E	Alathon-16	4	0.923	400	Flat	4.0	none

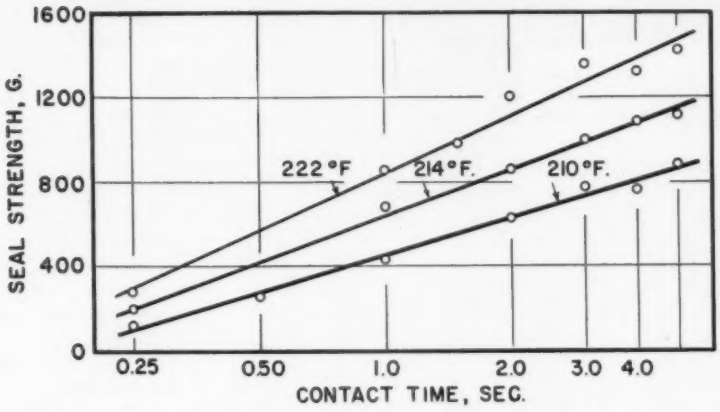

FIG. 4: Seal strength of Film **C** at 10 p.s.i. rises linearly with the logarithm of contact time, and increases very sharply with the platen temperature.

The error function, *erf*, is defined by the equation

$$erf\ y = \frac{2}{\pi} \int_0^y e^{-u^2}\, du \qquad \text{Eq. 4}$$

This may be evaluated from tables of areas under the normal distribution that are available in all statistics texts and many handbooks.[1]

To find the temperature, τ, at the interface, set x in Eq. 4 equal to B, the thickness of the upper film.

$$\frac{T_p - \tau}{T_p - T_i} = erf\left[\frac{B}{2\sqrt{\alpha t}}\right] \qquad \text{Eq. 5}$$

To simplify the calculation of interfacial temperatures, the solutions of Eq. 5 were worked out for a number of values of t and B, and the results were plotted in Fig. 7, p. 112. In the construction of Fig. 7, the value of 1.6×10^{-3} cm.^{2}/sec. was assigned to α.

Using Fig. 7 it is possible to calculate τ for each heat seal experiment. As an example, consider the case where the film is initially at 100° F., the platen temperature is 300° F., and 2-mil film is being sealed at a contact time of 0.5 second. From Fig. 7 the value of the dimensionless temperature ratio is

$$\frac{T_p - \tau}{T_p - T_i} = 0.10 = \frac{300 - \tau}{300 - 100}$$

from which the value of τ is found to be 280° F.

By using this method the value of τ for each point plotted in Fig. 4 was calculated. These points are replotted in Fig. 8, p. 114, where the ordinate is the seal strength and the abscissa is τ.

In Fig. 8 all of the points fall on a single curve, indicating that τ is a much more significant variable in heat sealing than platen temperature. Since the seal strength is affected only slightly by changes in pressure, it would appear possible to characterize the sealability of a film in the low-seal-strength region (below about 1500 g./in.) by specifying the value of τ required for a seal of a given strength to be formed.

The experimental data shown in Fig. 8 cover a range of contact times from ¼ to 5 sec., a 20-fold variation. It is unlikely, however, that the simple relationship shown in Fig. 8 would be valid for seal strengths in excess of about 1500 grams. For seals of higher strength it is probable that a different type of seal is formed. This other type of seal, referred to as a fusion seal, is discussed below.

Fusion seals

It is well known that with polyethylene film of about 2-mil thickness, high peel strengths (those exceeding about 1500 g./in.) cannot be reliably determined. There are, however, certain applications in which ultra-high-strength seals are required —for example, military barrier material.

The Fusion-Temperature Test[2] (F-TT) apparently gives a reliable indication of the ease with which a given material will form a fusion seal. A fusion seal is defined as one of such high strength that the films cannot be separated even by slow and careful hand delamination. The F-TT determines the temperature required to form fusion seal at constant time and pressure.

The following procedure was used to determine the fusion temperatures reported in this paper: A heat seal was made using the method and apparatus described previously. A wedge-shaped strip about 1 in. long and about ¼ in. wide at the broad end was cut from the sealed area with the broad part of the wedge extending into the unsealed region. The free ends of the sample were grasped and the films slowly pulled. If it were possible to separate the films, the platen temperature was raised **(To page 112)**

[1] The error function for any $y = x/2\sqrt{\alpha t}$ is equal to the area under the normal curve between the abscissa values $-y\sqrt{2}$ and $+y\sqrt{2}$; if the table is one-tailed, erf y = twice the area from zero to $+y\sqrt{2}$

[2] Developed by Union Carbide Plastics Co. and described in their Technical Bulletin No. 230.

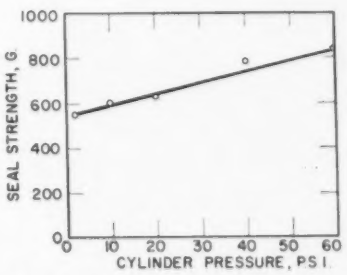

FIG. 5: Sealing pressure has slight but definite effect on strength of Film **B** seals made at 225° F. and one second of contact time.

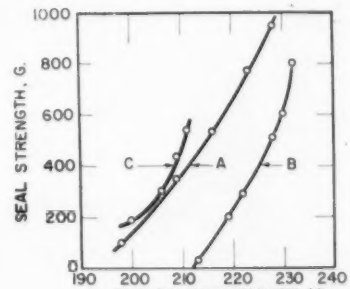

FIG. 6: Effect of platen temperature on seal strength of Film **A, B, C.**

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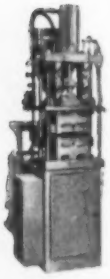

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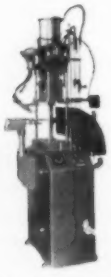

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Table II: Effect of storage conditions on sealability of Film D

	A	B	C
	°F.	°F.	°F.
τ_{500} (500 g. seal temperature)	223	235	233
τ_f (fusion temperature)	322	380	520

A: Storage for 13 days at room temperature.
B: Storage for 34 days at room temperature.
C: Storage for 13 days at room temperature and 21 days in an air oven at 150° F.

and another seal made and tested. This procedure was repeated until a sufficiently high platen temperature was reached that the films could not be pulled apart. This temperature was called the fusion temperature, designated by the symbol τ_f.

Typical fusion temperatures are in the range of 300 to 600° F. The fusion temperature is particularly sensitive to the conditions under which the sample is stored after extrusion. This is illustrated by the data shown in Table II, above. Here, the 500-g. seal temperature (designated as τ_{500}) and fusion temperature for Film D were determined on films aged under three conditions.

Discussion

The data of Table II show that the τ_{500} value is only slightly increased upon aging. The fusion temperature, however, shows a drastic increase upon aging.[3] The following discussion is an attempt to interpret these results in terms of molecular mechanisms and to assess their importance to the flexible-packaging industry.

Consider two films brought into intimate contact at a temperature above their softening point. Due to molecular motion, parts of polymer chains from the one film will cross the interface and enter the other film, and vice-versa. If this diffusional process continues for a long enough period of time, the interface loses its identity and the films are said to be fused. The time required for this condition to be reached is obviously a strong function of temperature. At high temperatures, where the viscosity is low, a state of near fusion can be reached in a matter of seconds. On the other hand, at temperatures in the neighborhood of the softening point, fusion might require days or weeks.

In the fusion test reported here, contact time was arbitrarily set at 1 second. The fusion temperature, therefore, is that temperature at which the polyethylene becomes sufficiently fluid or mobile so that in a period of 1 sec. molecular diffusion makes the interface lose its identity. In brief, then, the molecular mechanism leading to a *fusion seal* must involve diffusion of polymer chains across the interface.

We now consider the low-strength seals of which the data of Fig. 8 are typical. Here the strength of the seal at a given interfacial temperature is independent of time (at least over the range of ¼ to 5 seconds). Therefore, the mechanism must be one which operates at an extremely rapid rate. Since seal temperatures are much lower than fusion temperatures—in some cases being below the melting point of the polyethylene—the possibility of polymer chain diffusion being significant must be ruled out.

It is probable that these low-strength seals are the result of intermolecular attractive forces acting across the interface. Figure 8 shows that bonds having strengths as high as 500 g. can be obtained at temperatures as much as 20° below the melting point. This is not an unreasonable result, as the intermolecular forces will become operative whenever the surfaces of the two films are brought into close proximity.

The range of temperature over which seals of this type are formed should be relatively short. At temperatures too far below the melting point the films will be too rigid to be pressed into intimate contact. At temperatures much above the melting point, the polyethylene will be so fluid that seals approaching the fusion type will be formed. This is the type of behavior shown in Figure 8.

The chemical nature of the *surface* should have a strong effect on low-strength seals. It is

[3] This effect has been observed and reported in Technical Bulletin No. 230 of Union Carbide Plastics Co.

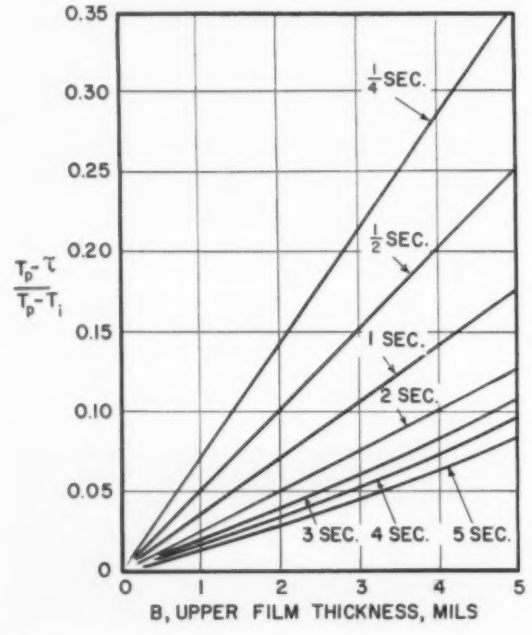

FIG. 7: Graphical solution of Equation 5, p 109.

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well known that intermolecular attractive forces between polar molecules are stronger than those between non-polar molecules, so that polyethylene films having surfaces of high polarity should be more readily sealed than those having low polarity. Treatments given to polyethylene film to increase its affinity for printing ink cause the formation of oxidized (polar) groups on the surface of the film. It should be expected, therefore, that the sealability of polyethylene film could be increased by surface treatment. Table III, below, shows the results of measurements made on untreated films and then on the same films after electrostatic surface treatment.

As shown by Table III, the value of τ_{500} for the treated film runs 20 to 30° F. lower than for the untreated films. Therefore, seals of 500 g. strength are more readily formed between treated than between untreated film. However, it should not be concluded that surface treatment will reduce the *fusion* temperature of a film. Fusion temperatures depend upon motion of the polymer chains. Therefore, fusion is more dependent upon bulk rather than surface properties and surface treatment should have a small effect on fusion temperatures. Experiments indicate that surface treated films show a rapid increase in τ_f upon aging. The effect of surface treatment on τ_f of unaged films is still open to question. Our unpublished experimental data are inconclusive and somewhat contradictory, and further work is needed before sound conclusions can be drawn.

As Table II shows, fusion temperatures increase drastically upon aging, while the 500-g.-seal temperatures are relatively unaffected. It is probable that the chemical reactions occurring during aging lead to cross-linking in the bulk of the polymer and that the polarity of the surface is relatively unchanged. This is further evidence relating fusion temperatures to the bulk properties of the polymer and the 500-g.-seal temperatures to the surface properties.

To summarize: It has been shown that two different types of heat seals can be formed. The ability of a film to form one type of seal is characterized by τ_f, the fusion temperature, and for the other type by τ_{500}, the 500-g.-seal temperature. The evidence suggests that the molecular process leading to the first type of seal is predominantly one of diffusion of polymer chains, as the value of τ_f is drastically affected by conditions which tend to reduce the mobility of polymer chains, such as cross-linking. The evidence also suggests that the second type of seal depends primarily upon intermolecular attractive forces. The value of τ_{500} can be reduced by increasing the polarity of the surface of the film.

It is apparent that there is no one single property or test that can characterize the "sealability" of a film. Sealability testing should be related to the use to which the film is to be put. For example, if the film is to be used for a military barrier material, which must qualify under specification MIL-B-131-C, then the fusion temperature should give a reliable indication of performance. On the other hand, if the material is to be used as an overwrap for a candy box, then specifications requiring fusion strength seals would be most unrealistic. In this case the 500-g.-seal temperature might be a realistic criterion of sealability. Since the present work provides an understanding of the nature of the heat seal process, it also provides a basis for the establishment of reliable and realistic standards for heat-sealable packaging film.

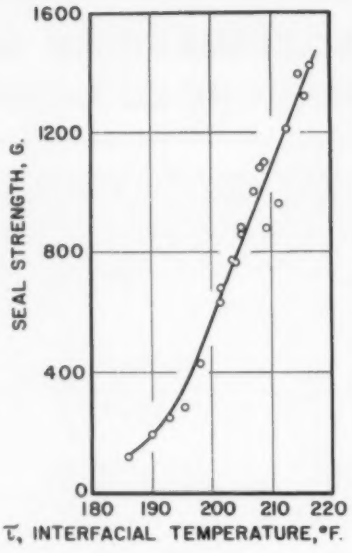

FIG. 8: Seal strengths obtained at various contact times and platen temperatures show common dependence on the interfacial temperature.

Table III: Effect of surface treatment on sealability

	τ_{500}	
	Treated	*Untreated*
	°F.	°F.
Film D	205	223
Film E	190	225

The following example illustrates the importance of sealability in a production operation. A machine is sealing bags made of 2-mil polyethylene film. The required seal strength is about 500 g./in. The platen temperature is maintained at 400° F. and the initial temperature of the film is about 80° F. What is the required contact time when the value of τ_{500} is 300° F.? When it is 375° F.?

The relationship between contact time and the τ_{500} value is given by Eq. 5. For the case where the argument of the error function is small, Eq. 5 can be:

$$\frac{T_p - \tau_{500}}{T_p - T_i} = \frac{B}{\sqrt{\alpha \pi t}} \qquad \text{Eq. 6}$$

Solving Eq. 6 for t, one obtains

$$t = \frac{B^2}{\alpha \pi} \left[\frac{T_p - T_i}{T_p - \tau_{500}} \right]^2 \qquad \text{Eq. 7}$$

The average value of the thermal diffusivity of polyethylene is about 1.6×10^{-3} cm.^{2}/sec. With a τ_{500} value of 300° F., the required contact time is 0.045 second. For the case where τ_{500} is 375° F., the required contact time is increased to 0.72 sec., a 16-fold increase.

If about 0.25 sec. are required to position a bag in the machine and to remove the bag from the machine after the seal is made, then the maximum allowable rate in the first case will be about 200 bags per minute, and in the second case about 60 bags per minute. This is a significant decrease in production.—**End**

Blow molding polyethylene—Part 2

How quality factors—gloss, roughness, welding at seal, and wall uniformity—are affected by processing variables

By R. L. Wechsler* and T. H. Baylis*

In Part 1 of this article (MPL, May 1959, p. 107) we discussed the effects of material and processing factors on wall thickness and permeability of blown polyethylene bottles, and on the minimum cooling time required to chill them to handling stiffness. In this concluding part, we intend to show how certain "quality" factors—appearance, welding at the seal, uniformity of wall thickness, and shrinkage—are influenced by processing conditions.

Appearance

The appearance of articles blow molded from extruded tubes are subject to the same appearance defects as other types of extrusions, namely: 1) limited surface gloss, 2) die lines, and 3) roughness. All of these defects can be minimized by the proper choice of molding conditions. As is the usual case with thermoplastics, the molding conditions which give the best looking bottles also give the longest cycles so that compromises must be made.

Gloss: The blow molded bottles were rated for gloss against standards which ranged in six gradations from the surface finish of a high-quality injection molded piece (Rating 1) to a definite matte finish (Rating 6). The average gloss rating of commercially produced squeeze bottles is about 3 on the scale.

Material temperature is the only *molding* variable with appreciable effect on gloss. As Fig. 13, above, shows, increasing material temperature 100° F. improves gloss by an average 1.5 rating units on the gloss scale. The only exception was with the low-melt-index, high-density Resin *E* where the improvement was only one-third as great. (Resin *C* was observed over too narrow a temperature range to be sure of the temperature-sensitivity of its gloss.) Some bottles produced at low material temperatures take on a decided frosty appearance.

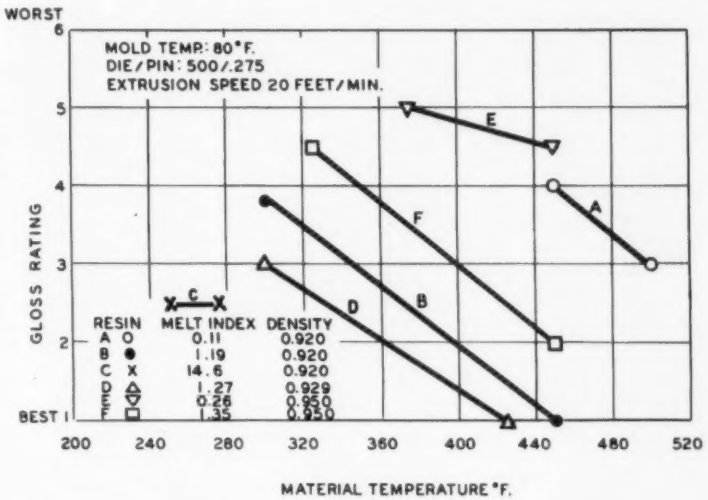

FIG. 13: Gloss of the bottles improves as the melt temperature and the melt index of resin increase. The gloss appears to be best at the intermediate density.

The plot of gloss rating versus material temperature in Fig. 13 also shows the beneficial effect on gloss of increasing melt index. (Compare Resins *A*, *B*, and *C* and also Resins *E* and *F*). As a working approximation, a 10-fold change in melt index is equivalent to a 100° F. change in material temperature; or a 10-fold increase in M.I. will permit molding articles of equivalent gloss on a 50% shorter cycle. The limit on M.I. is set by the properties

Table II: Range of shrinkage for various resins

Resin	*Melt index dg./min.*	*Density g./cc.*	*Shrinkage range mils/in.*
A	0.11	0.922	28–46
B	1.19	0.922	20–45
C	14.6	0.922	20–37
D	1.27	0.929	33–46
E	0.26	0.950	40–50
F	1.35	0.950	40–50

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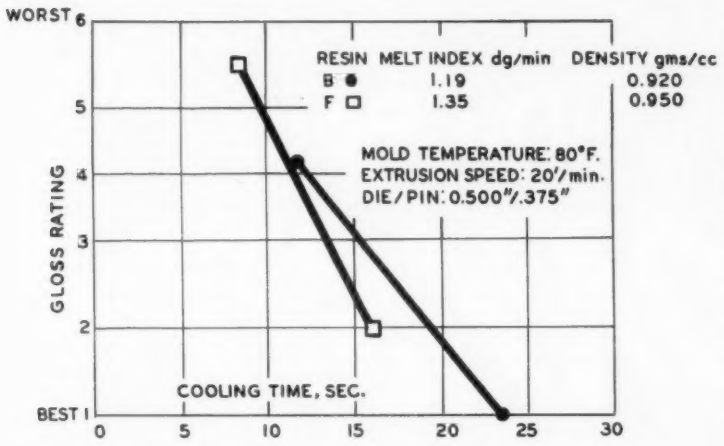

FIG. 14: Gloss improves if the bottles are kept longer in contact with the mold surface (cooling time lengthened).

Table III: Recommended conditions for blow-molding start-up

	Resin B	*Resin E*
Kind of bottle	squeeze	rigid
Density, g./cc.	0.920	0.950
Melt index, dg./min.	1.2	0.3
Melt temperature, °F.	325 to 350	400
Mold temperature, °F.	80	80 to 150
Blowing-air pressure, p.s.i.	20 to 80	50 to 80
Land length of tubing die, in.[a]	1.0	1.0
Air opening, in.[b]	1/16	1/16

[a]Presumes extrusion speed of 20 ft./min.
[b]Depends on bottle volume; large (6 oz. and over) bottles may require faster air flow and larger openings.

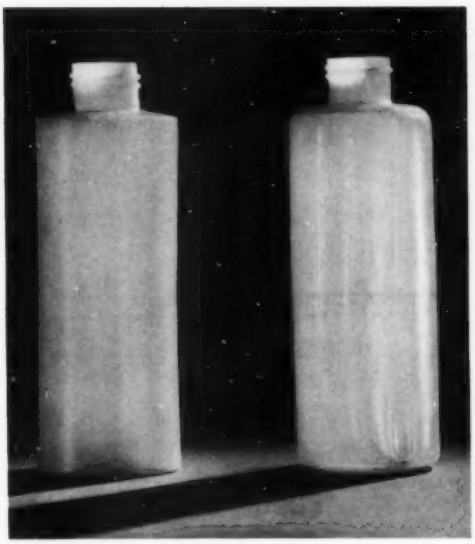

FIG. 15: Die lines are absent in bottle at left; severe in one at right.

of the piece, particularly stress-cracking resistance.

The gloss of the high density resins is substantially poorer than that of the low density materials. (Compare Resins *B* vs. *F* and *A* vs. *E*). The intermediate density resin (Resin *D*) was the glossiest of all, pointing up the possibility that the relationship between gloss and density may have a maximum point somewhere in the middle of the density range.

Figure 14, above, is a plot of gloss rating versus minimum cooling time at a fixed set of conditions for Resins *B* and *F*. These resins have similar melt indices but differ in density. It can be seen that in producing pieces of equivalent gloss the cooling times of the two materials are comparable despite the higher melting point advantage of the high-density material. This results from the higher temperatures necessary to obtain good gloss with the high density resin.

Die lines: Die lines are surface imperfections resembling scratches that run the length of the blow molded part. These lines are formed on the parison as it is extruded and are transferred directly to the blow molded article. The cleanliness of the tubing die is important in minimizing this defect and chrome plating of these parts is recommended. However, even with carefully cleaned dies the defect is sometimes formed, particularly with the high density resins. Die lines are found on both the inside and outside of the piece and with the more transparent materials the effect is cumulative. The range of die lines is shown photographically in Fig. 15, below.

This defect is minimized by any action that tends to minimize the cooling of the melt until it is pressed against the mold surface. This flattens out the die lines. Such actions include:

1) Increased blowing speed—It is important to admit the air into the mold rapidly so that localized areas are not touched to the mold surface and allowed to freeze before the rest of the piece is filled out and high pressure developed in the mold.

2) Increased blowing air pressure—High air pressure is desirable since it not only causes faster filling of the mold but also increases the force which flattens out the die lines. Figure 16, p. 120, is a plot of severity of die lines versus blow air pressure at two blowing speeds. The speed of blowing was varied by putting a restriction in the air line to the mold. The data show the decreased die lines due to the higher air pressures and faster blowing speed.

3) Increased mold temperature—A warmed mold will reduce the chilling of the surface so that it is still pliable when the pressure develops in the mold.

Figure 17, p. 120, shows a plot of die lines rating versus material temperature. It shows that going to higher density tends to cause more die lines. This is due to the higher **(To page 120)**

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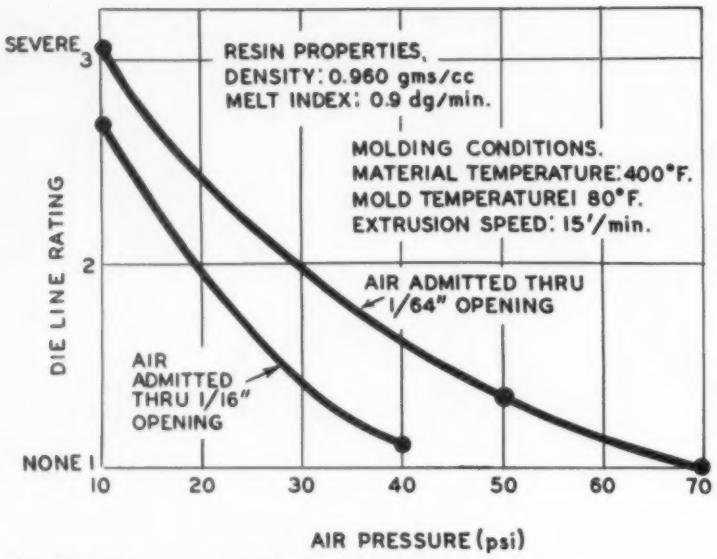


FIG. 16: Die lines can be eliminated entirely by making sure that the blown parison is forced into a good contact with the mold surface by using high air pressure.

melting points of these resins which causes them to freeze faster when they contact the mold surface. As is seen in Fig. 17, changing resin viscosity by changing either material temperature or melt index is without effect on die lines, the slight inconsistent trends being insignificant.

Die lines are not usually a problem with the materials in the squeeze-bottle-density range. With the high-density materials this defect can be a serious limitation on surface appearance unless the proper molding conditions are employed as described above.

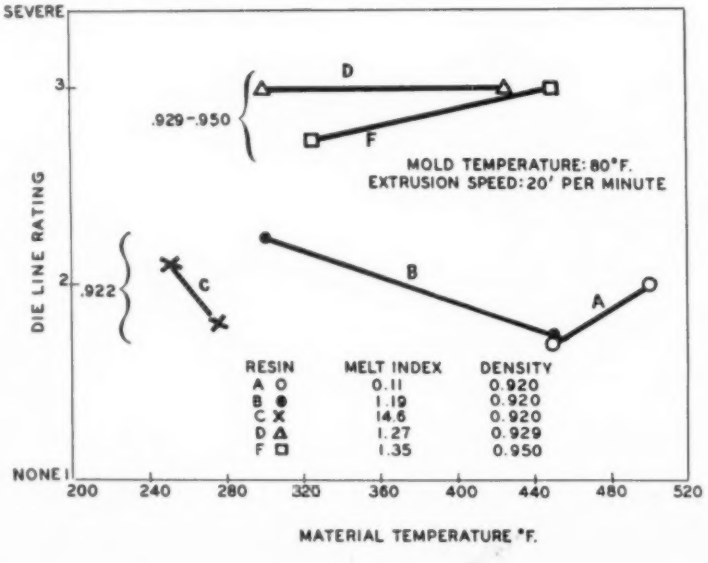
Roughness: This defect is better called internal roughness since the roughness on the outside of the molded piece is flattened out in the blowing process. As this defect is on the inside, it is a problem only with the more transparent materials. The roughness is formed perpendicular to the axis of extrusion. Figure 18, p. 122, shows two bottles, one smooth, the other with severe internal roughness.

Die land length and extrusion speed are important interrelated variables. In general, increasing land length and decreasing extrusion rate decreases the roughness. For an extrusion rate of 20 ft./min. a land length of at least 0.75 in. and preferably longer is recommended. Further, additional land length is recommended for higher extrusion rates.

Usually, decreasing melt viscosity, either by increasing temperature or using a higher-melt-index material will reduce the roughness.

Physically speaking, roughness is more pronounced with heavier-wall bottles (smaller pin size) and resins in the melt index range of 1 to 3 dg./min. Practically, however, it is more of a problem with the thinner-wall bottles because of their increased transparency which permits the roughness to be seen. When the melt index was changed markedly from the 1 to 3 dg./min., range reverse effects were found. Internal roughness was more pronounced with thinner wall bottles made from Resin *A* (0.1 melt index) and Resin *C* (14 melt index).

FIG. 17: Die lines cannot be controlled by adjusting the melt temperature of the extrudate.



Welding integrity (pinch off)

In the laboratory studies the ends of the tube were sealed by special blades at the bottom of the mold as it closed. The quality of the seal so made depends on both molding and material variables and the design of the blades.

Three degrees of seal integrity are shown in Fig. 19, p. 124; note that in the extreme case, degree 3, the bottom of the bottle is not even closed.

Increasing the mold temperature degrades pinch-off. At a mold temperature of 120° F. and material temperature of 300° F. Resin *B* failed to seal. Higher mold temperatures (above 150° F.) are permissible with the high density resins before trouble with pinch off occurs.

Changes in material temperature show differing effects with the various resins used. With the low and medium density materials (0.920–0.929 g./cc.) increasing the melt temperature improves pinch-

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off; with the high density resins (0.950 g./cc.) the reverse is true. At very high material temperatures (475° F. and above) the high density materials fail to seal.

The pinch-off with thinner tubes was better with all materials tested. This is probably connected with the width of the pinch-off blades relative to tube thickness. Wider pinch-off blades will improve pinch off. The blades used in this study were 0.022 in. thick.

Normal and special, or "V," designs of pinch-off blades are shown in Fig. 20, p. 124. The V blades give a seal which has substantially less variance in cross section and leaves the bottom curved upward. This adds to the strength of the bottle.

Increasing air pressure degrades pinch off. This is the only detrimental effect of high air pressure on bottle properties. On the average the effect of increasing air pressure is small but in some cases an increase from 15 to 50 p.s.i. caused a change as much as 2 gradations on the scale shown in Fig. 19.

Figure 21, p. 124, shows a plot of pinch off versus material temperature. The plot illustrates that increasing the melt index improves pinch off. As with gloss, a 10-fold change in melt index is roughly equivalent in effect on pinch off to a 100° F. change in material temperature. Resin density *per se* has little, if any, effect on pinch off. It is of interest to note that with the high density resins, raising the melt index more than offsets the detrimental effect of increased temperature in improving pinch-off integrity.

FIG. 18: Internal roughness, which detracts from appearance of clear bottles, is severe in specimen at right, absent in one at left.

Shrinkage

The range of shrinkage for blow molded polyethylene is from 20 to 50 mils/in. depending on the resin and the molding conditions.

Table II, p. 115, shows the range of shrinkage encountered with the various resins used. The important resin variable is density—increases cause increased shrinkage. This is the natural result of the high crystallinity (and consequently density) achieved by these resins as they cool. Note that the shrinkage of blow molded polyethylene is subject to considerable variability.

Shrinkage can be reduced by raising the pressure of the blowing air. Changes in mold temperature, pin size, and extrusion speed are usually without appreciable effect. Contrary to experience in injection molding, raising the melt temperature in blow molding helps to *reduce* surface shrinkage. This happens because more of the volumetric shrinkage is taken up by reduction of wall thickness which in turn is due to lower blowing stresses and less strain recovery in the hotter melt.

Wall thickness uniformity

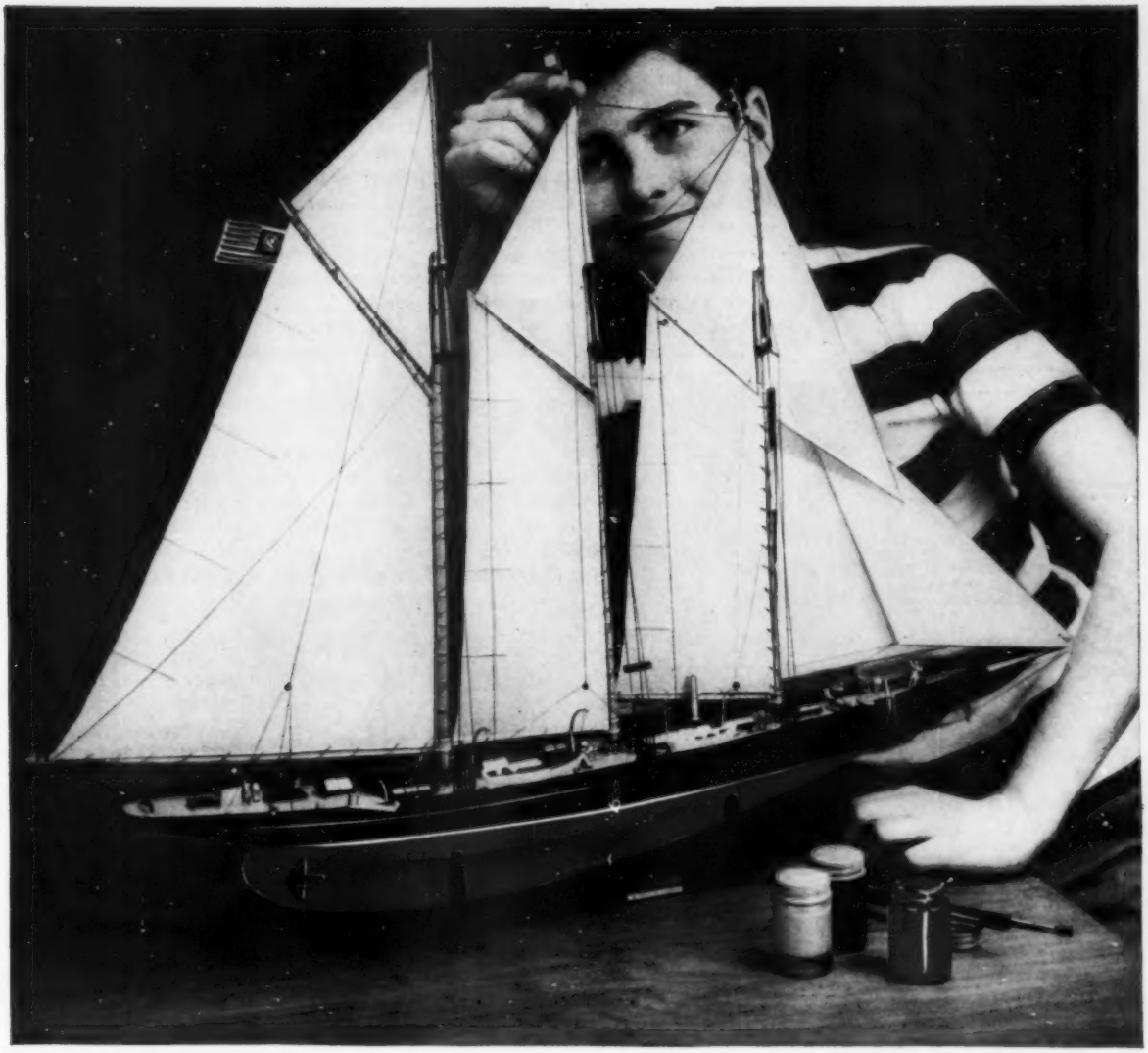
The principal disadvantage of blow molding is the difficulty of control of wall thickness. This problem becomes particularly acute with pieces of irregular shape and in instances where sharp radii are designed into the piece. A proportionate (range/average) circumferential varia-

Table IV: Effects of molding, material and design variables on bottle properties and cycle time

To change property (for Resin B, E, and F) change variable as shown.

	Molding				Material		Design				
	Mat'l temp.	*Mold temp.*	*Air pressure*	*Extrusion speed*	*Melt index*	*Density*	*Die land*	*Die smoothness*	*Blade thickness*	*Mold coring*	*Air opening*
Increase bottle weight	D[a]	—	—	I[b]	D	D	—	—	—	—	—
Decrease minimum cool time	D	D	I	—	—	I	—	—	—	—	—
Improve appearance	I	—	—	—	I	I-D[d]	—	—	—	—	—
Increase gloss	—	I	I	—	—	D	—	I	—	—	I
Decrease die lines	I	—	—	D	I	—	I	—	—	—	—
Decrease roughness											
Improve functionality	I-D[c]	D	D	—	I	—	—	—	I	—	—
Improve pinch-off	D	—	—	D	—	—	I	—	—	—	—
Increase wall thickness uniformity	I	I	I	—	—	D	—	—	—	—	I
Reduce thinning at parting line	D	—	I	—	—	D	—	—	—	—	—
Decrease shrinkage											

[a] I—increase
[b] D—decrease
[c] Increase with low density (0.929 g./cc. and lower), decrease with high density (0.950 g./cc.)
[d] Inconsistent effect—see text on gloss, p. 115.



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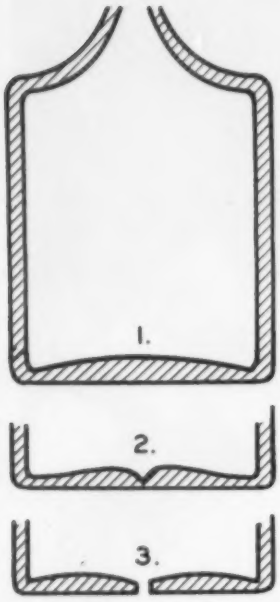

FIG. 19: Sketches showing degrees: 1 (best); 2 (intermediate; 3 (worst) of pinch-off at bottom of bottle.

tion of 30 to 40% in the wall thickness of commercially produced cylindrical bottles is not uncommon.

Variability due to piece geometry: For most practical purposes the wall thickness at any particular point can be expected to be proportional to the distance that the tube is blown out. Shown in Fig. 22A, p. 127, for example, is the wall-thickness distribution found with a rectangular shape that has been blown from a cylindrical tube.

Figure 22B shows the improved wall-thickness distribution obtained by blow molding the same rectangular shaped piece using an elliptical pin in the tubing die. The ability to compensate for irregularities in the shape of the piece along the axis of extrusion by adjusting the shape of the blank is an important advantage of blow molding over vacuum forming with sheet.

The design of the irregular pins for the tubing die is largely a matter of experiment. The first try is best predicated on the assumption that the wall thickness will be proportional to the distance that the tube is to be blown out. Several tries may be necessary, since the rule is not precise and also since the theoretical design may be impractical to machine.

Random variability: With cylindrical shapes the most obvious necessity for good wall thickness distribution is that the pin be centered in the die. However, even with scrupulous care in this regard considerable random variability is nevertheless encountered.

The most important variable in both consistency and magnitude of effect on circumferential wall thickness uniformity with cylindrical bottles is extrusion speed. The slower the extrusion rate the more uniform the bottle wall. The data in Fig. 23, p. 127, illustrate this effect. The extrusion speed, of course, is directly allied with the production rate and, therefore, only limited reductions are practicable.

Thinning at the parting line: A wall thickness distribution unique with the high density resins is thinning at the parting line of the mold or other places where hot spots are likely to develop. The problem is particularly acute with regard to thin-walled pieces.

This defect is apparently caused by the slower cooling of the bottle at places in the mold where the surface temperature gets higher than at other areas. Material is drawn from those warmer areas to make up the shrinkage of the material in the faster cooling regions. Excellent coring of the mold with special attention to the parting line area and location

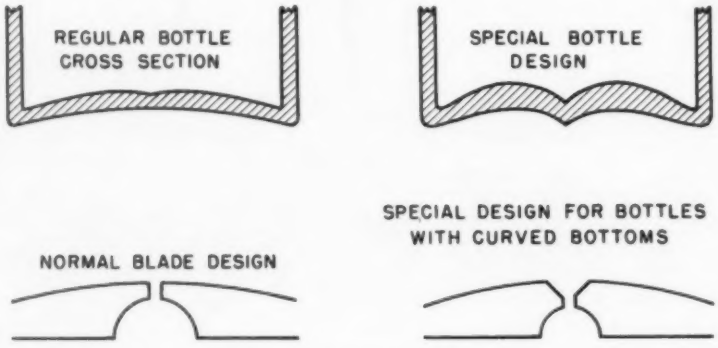
REGULAR BOTTLE CROSS SECTION
SPECIAL BOTTLE DESIGN
SPECIAL DESIGN FOR BOTTLES WITH CURVED BOTTOMS
NORMAL BLADE DESIGN

FIG. 20: Shape and strength of bottle bottom can be controlled by design of pinch-off blade.

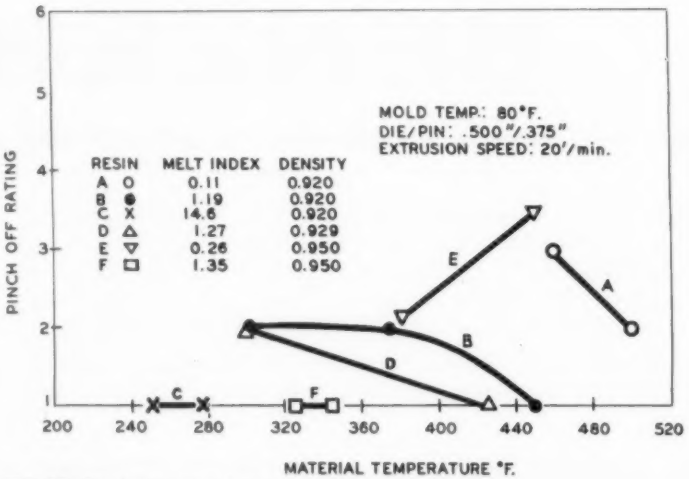
MOLD TEMP.: 80°F.
DIE/PIN: .500"/.375"
EXTRUSION SPEED: 20'/min.
RESIN MELT INDEX DENSITY
A O 0.11 0.920
B ● 1.19 0.920
C X 14.6 0.920
D △ 1.27 0.929
E ▽ 0.26 0.950
F □ 1.35 0.950
PINCH OFF RATING
MATERIAL TEMPERATURE °F.
200 240 280 320 360 400 440 480 520
1 2 3 4 5 6

FIG. 21: Pinch-off rating improved with increasing material temperature, over temperature ranges investigated. Contrary behavior of resins **C, F,** and **E** indicate that pinch-off must be ascertained for each material.

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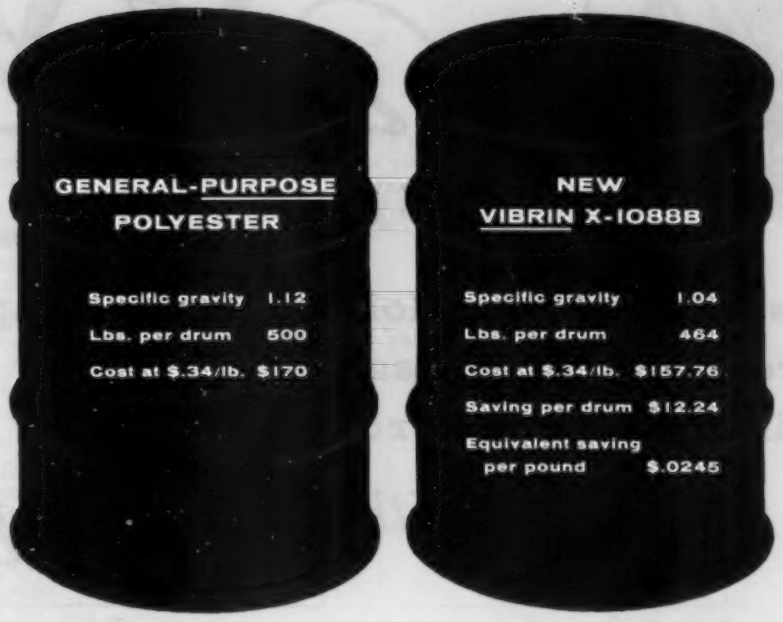

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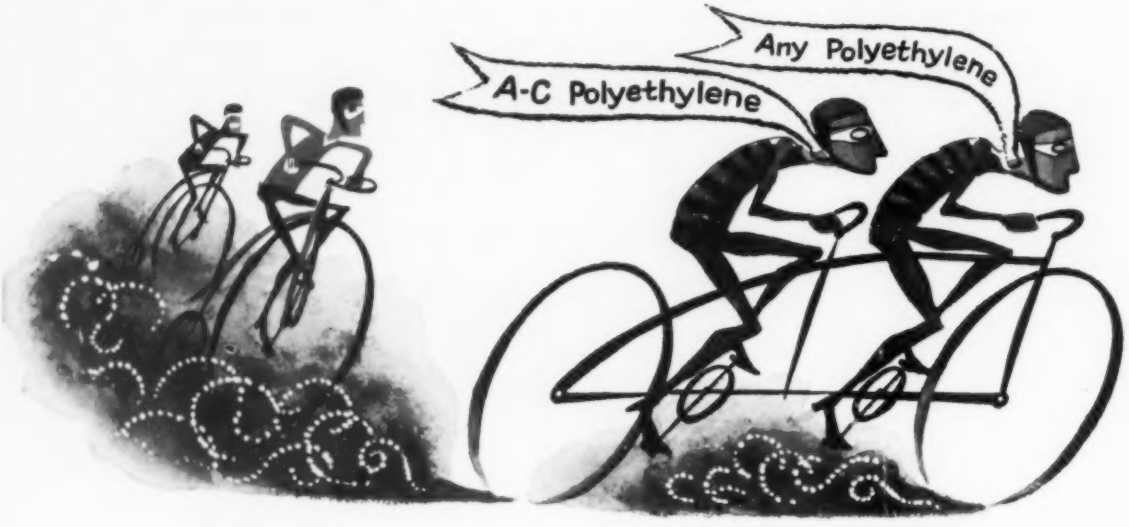

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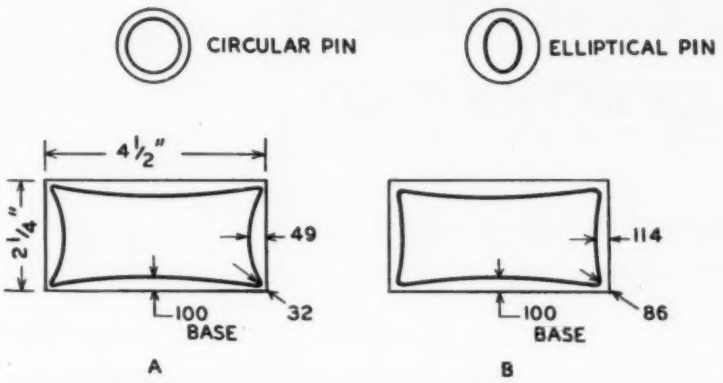


FIG. 22: Uniformity of wall thickness can be improved by making parison thickest in regions of greatest draw.

of any insert parts, etc. is the first step in avoiding this problem.

Thinning at the parting line is minimized by increased mold and material temperatures, blowing air pressures and blowing speeds. At 80° F. mold temperature and 30 p.s.i. blowing-air pressure (through a 1/64-in. opening) the defect was very pronounced. Increasing air pressure to 80 p.s.i. or mold temperature to 180° F. or air opening to 3/16-in. eliminated the defect. Smaller changes might also do the same thing.

Conclusion

There are two major compromises to be made in blow molding operations. The first compromise is in material selection and the second in molding conditions.

High molecular weight is recognized as desirable in polyethylene resins for optimum resistance to stress cracking and for maximum toughness. The effect of molecular weight on stress cracking resistance is well known. Figure 24, right, shows a plot of tensile impact strength of high density resins versus melt index (a measure of molecular weight) illustrating the increased toughness with increased molecular weight. The high molecular weight, of course, also results in high resin viscosity with consequent poorer processability, and it is necessary to compromise bottle properties and processability.

The selection of molding conditions involves a similar compromise. It has been shown that high material and/or mold temperatures are beneficial to piece appearance and welding efficiency. It is further established that the same high material and mold temperatures are detrimental as regards cycle time. A compromise is necessarily made between piece quality and cycle time.

While it is obviously impossible to select a set of optimum conditions for all jobs the information presented in the above discussion can be used to estimate a set of starting conditions and to indicate what variable to change and in what direction to go to effect improvement in any particular property. The information will also indicate what compromises might be necessary. The recommended starting conditions for the squeeze bottle Resin *B* and a typical high density Resin *E* are shown in Table III, p. 117. Table IV, p. 122, summarizes the effects of the molding, material and design variables on the properties of interest.—**End.**

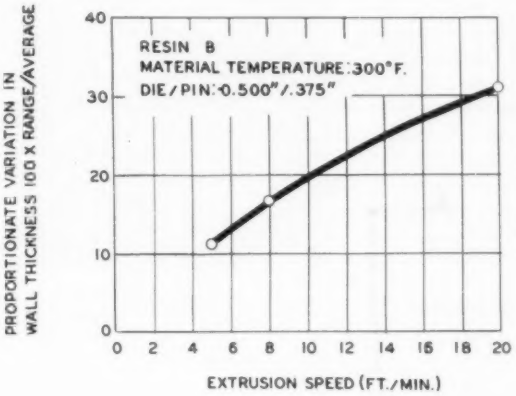
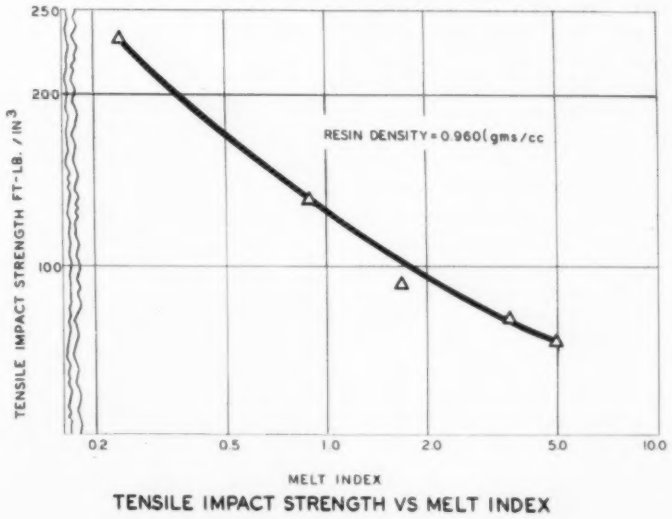


FIG. 23: Under conditions of these experiments, extrusion speed had a strong effect on uniformity of wall thickness.

FIG. 24: Ability of bottles to survive rough handling depends on tensile-impact strength of resin. This is related to molecular weight, as measured by melt index.



How Ford automates polyester premixing

Details of an integrated operation that makes a better product at reduced material cost and 60% savings in time

By K. A. Mack*

Reinforced polyester premix for 1959 Ford heater-part housings is now prepared for molding in a completely new integrated plastic mixing line which compounds approximately 1800 to 2400 lb./hr. A schematic layout of this line is shown in Fig. 1, right.

The installation, established at Ford's Hardware and Accessories Div., Ypsilanti, Mich. plant, is one of the largest operations of its type in the country. It represents a new field for Ford—one that is paying off in reduced costs, elimination of stamping operations formerly required for metal housings, and a saving in time of 60% in the production of rigid, high strength plastic housing shapes of improved quality.

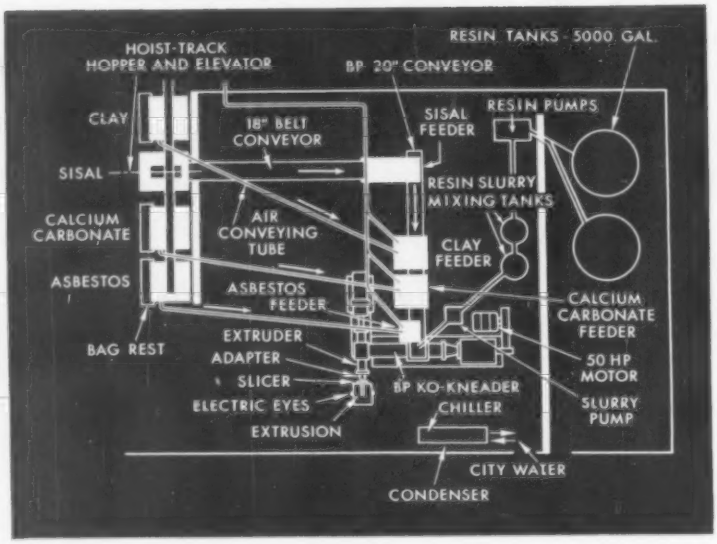


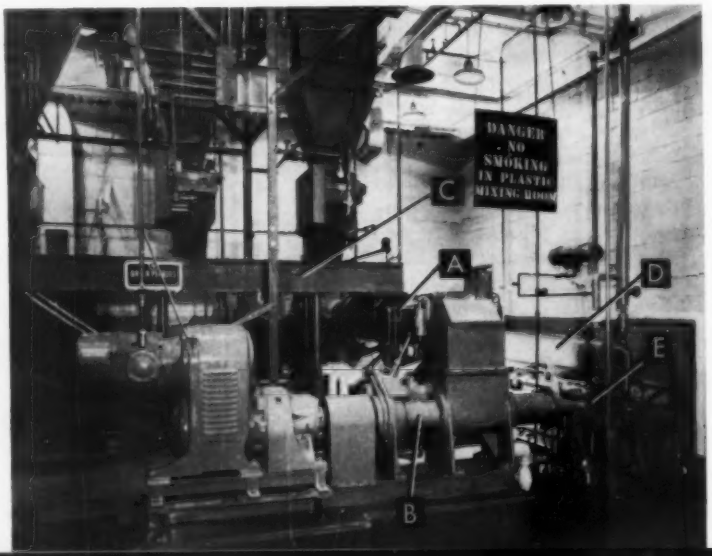
FIG. 1: Schematic diagram of automated premixing line shows how catalyzed, pigmented resin slurry and mixed fillers and sisal fibers converge at feed hopper of intensive mixer, then are mixed, extruded and cut to precise length.

What are the components?

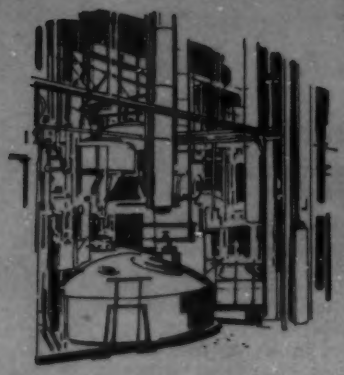
The premixing system, designed, engineered, and installed as a "package" for Ford, with the assistance of Ford engineers, by the Chemical Machinery Div., Baker Perkins, Inc., Saginaw, Mich., is tied together by automatically actuated, low-pressure, high-volume pneumatic tubes, conveyors, hoppers, scales, and liquid conveying lines, that deliver the various premix ingredients to a 30-ft. continuous mixer, one of the first ever used for such a job. The mixer, called a Ko-Kneader, integrates the various operations and makes them completely automatic—from raw material storage areas to the cutoff station, where 2-in. diameter billets are cut to precise weight.

The Ko-Kneader operates on a unique principle that enables the screw in the barrel of the machine to both rotate **(To page 206)**

FIG. 2: Focal point of automated premixing line is Ko-Kneader (A) which is fed by conveyor (C), in turn supplied by hoppers in upper left and other feed elements not shown here. Product of mixer, which is kept cool by chiller (D), is delivered directly to extruder (B) which forms it into cylindrical "rope." At extruder exit (E) rope is cut into uniform lengths and then delivered to molding machines in another room.



* Vice-Pres., Chemical Machinery Div. Baker Perkins, Inc., Saginaw, Mich.



ROHM & HAAS COMPANY

plasticizers and modifiers

FOR VINYL AND RELATED POLYMERS

Rohm & Haas broad variety of plasticizers for vinyls range from monomeric esters—MONOPLEX plasticizers—to complex high molecular weight polymers—PARAPLEX plasticizers. In addition, Rohm & Haas offers three ACRYLOID resins (acrylic polymers) which are designed to improve the performance properties of rigid and semi-rigid vinyls—particularly processing characteristics and impact strength.

If you process vinyls, here's what you should know about these plasticizers and modifiers.

Plasticizer Performance Properties in Equal Hardness Formulations

PLASTICIZER GRADE	% Plasticizer to give 10 sec. Shore A Hardness of 77	PERCENT EXTRACTION LOSS BY:				Low Temperature Flexibility[2], $T_{135,000}$, °C.
		Activated Carbon Volatility[1], 24 Hrs., 90°C.	Oil Extraction[1], 10 Days, 25°C.	Hexane Extraction[1], 2 Hrs., 25°C.	1% Soap Extraction[1], 24 Hrs., 90°C.	
PARAPLEX G-25	40.5	0.6	+0.2	0.9	0.3	−11.5
PARAPLEX G-40	45	0.7	0.2	0.3	12.0	−13
PARAPLEX G-41	41.5	0.5	0	0.3	3.2	−11.5
PARAPLEX G-50	39.5	1.1	3.0	3.6	8.4	−15
PARAPLEX G-53	40	0.8	1.5	1.7	3.3	−12
PARAPLEX G-54	39	0.7	2.1	2.5	3.6	−13
PARAPLEX G-60	37	0.8	4.8	12.1	1.0	−18
PARAPLEX G-61	37	0.7	4.4	11.5	0.5	−17.5
PARAPLEX G-62	36.5	0.6	3.9	10.8	0.2	−16.5
MONOPLEX S-38	35.5	2.0	2.7	11.5	17.8	−11.5
MONOPLEX S-70	34	8.4	20.5	23.3	8.4	−48.5
MONOPLEX S-73	34	2.5	18.0	22.6	9.4	−41.5
MONOPLEX S-90	40	0.9	2.7	27.7	0.6	−14.5
MONOPLEX DCP (Dicapryl Phthalate)	36	7.6	16.1	24.6	8.2	−25.5
MONOPLEX DOS (Dioctyl Sebacate)	35	4.1	15.9	28.0	1.0	−56
Dioctyl Phthalate[3]	35	7.6	7.7	21.8	7.8	−25

[1]Based on 10 mil thick film specimens.
[2]Clash-Berg method using 70 mil molded slab.
[3]Not offered—included for comparison only.

PARAPLEX *polymeric plasticizers*

Paraplex G-25

- ***exceptional permanence***
- ***excellent compatibility***
- ***high resistance to ultra-violet light***

Paraplex G-25 is a high molecular weight plasticizer which imparts exceptional permanence. Properly stabilized vinyl compounds which contain Paraplex G-25 plasticizer are outstanding in durability. Paraplex G-25 has excellent resistance to extraction by gasoline, oil, water, soap and detergents, as well as freedom from migration in contact with lacquer, alkyd and varnish finishes. Compatibility with vinyl resins is excellent. Original physical properties are retained even after prolonged service at elevated temperatures.

Typical uses include: high grade upholstery sheeting and coated fabric, refrigerator gaskets, surgical tapes; insulation resistant to high temperature, coaxial cable, window channeling, electrical tapes.

Paraplex G-40

- ***high resistance to migration into rubber***
- ***high resistance to extraction by oil***

Paraplex G-40 is a high molecular weight polyester plasticizer which combines permanence of plasticizing action with moderate cost. Compounds in which Paraplex G-40 is used show low losses due to volatility, resistance to extraction by aliphatic and aromatic hydrocarbons, and high resistance to migration into rubber and rubber-based materials.

Typical uses include: industrial hose and tubing, industrial and domestic flooring, shoe liners and counters, electrical tapes and industrial aprons.

Paraplex G-41

In resistance to extraction by hydrocarbons and to migration into rubber, Paraplex G-41 is on an equal footing with Paraplex G-40. However, Paraplex G-41 is superior in compatibility at high plasticizer levels and after long exposure to humid conditions, in plasticizing efficiency, ease of processing, low-temperature properties, and resistance to extraction by soapy water.

Paraplex G-50

- ***good processing characteristics***
- ***very good over-all permanence***

Paraplex G-50 is a general-purpose polymeric plasticizer similar to monomeric plasticizers in its handling and processing characteristics. It is notably superior to dioctyl phthalate in resistance to extraction by oils and hydrocarbons, freedom from volatility, and resistance to migration into lacquers, rubber, and typical baked finishes. Vinyl compounds containing Paraplex G-50 are very stable, as evidenced by the retention of original properties after prolonged aging at high temperatures.

Typical uses include: insulation resistant to high temperature, upholstery sheeting, coated fabric, flooring, refrigerator gaskets, window channeling, surgical tapes, electrical tapes, shoe liners and counters, pigment dispersion vehicles, doll compounds.

MONOPLEX *monomeric plasticizers*

Monoplex DOS

(dioctyl sebacate)

- ***outstanding performance at low temperatures***
- ***low volatility***
- ***resistance to extraction by soap and detergent solutions***

Monoplex DOS is an ester-type plasticizer widely used as a standard in vinyl compounds requiring flexibility at low temperature. It also provides low volatility, high plasticizing efficiency and excellent resistance to extraction by water, soaps and detergents. Like other plasticizers which impart low temperature flexibility, Monoplex DOS is susceptible to extraction by hydrocarbons and deficient on migration resistance. It is a very effective plasticizer for organosol and plastisol compounds.

Typical uses include: primary electrical compounds, sheeting and film for use at low temperatures, jacket compounds, strip-coating compounds.

Monoplex S-38

- ***excellent compatibility***
- ***good permanence at low cost***

Monoplex S-38 is a low-cost primary vinyl plasticizer particularly noted for its good permanence properties. It is high in molecular weight and offers definite advantages over dioctyl phthalate. Monoplex S-38 is lower in volatility and better in resistance to extraction by oil and gasoline. Compounds exhibit excellent freedom from tack and exudation. Monoplex S-38 also proves helpful in improving the compatibility of secondary plasticizers.

Typical uses include: low-cost sheeting, flooring, automotive harness tapes, low-cost gasketing, electrical jacketing stocks.

Monoplex S-70

- ***stabilization against effects of heat and light***
- ***good performance at low temperatures***

Monoplex S-70 is designed specifically to impart flexibility at low temperature. It is a very efficient plasticizer with good processing properties and a marked stabilizing effect. It has lower volatility than conventional plasticizers for low temperature applications. The stability imparted by Monoplex S-70 not only permits fast, high-temperature compounding, but also affords savings in stabilizer costs. Organosols and plastisols prepared with Monoplex S-70 are of low viscosity and have excellent viscosity stability.

Typical uses include: garden hose, film and sheeting for use at low temperatures, slush-molding compounds, electrical jacket stocks, automotive insulation.

Paraplex G-54

- *very good compatibility at high humidity and elevated temperatures*
- *high resistance to extraction by soapy water and oil*
- *excellent resistance to marring of polystyrene and baked enamels*

Paraplex G-54 was especially designed to provide freedom from exudation on exposure to high humidity at elevated temperatures. Other noteworthy properties which this plasticizer imparts include resistance to marring of polystyrene, lacquers, and baked enamels; good resilience; outstanding plasticizer efficiency; good electrical properties; resistance to copper corrosion; and resistance to extraction by soapy water, oils, and gasoline. The properties of Paraplex G-54 make it particularly well suited for many applications which require resistance to both aqueous and organic solvents.

Typical uses include: high-temperature electrical insulation, refrigerator gaskets, electrical and surgical tapes, babywear film, hospital sheeting, and upholstery (household and automotive).

Paraplex G-60

- *excellent resistance to extraction by soap and detergent solutions*
- *stabilization against heat*
- *accepted by F. D. A. for food packaging*

Paraplex G-60 is a light-colored, high molecular weight, ester-type plasticizer which provides effective heat and light stabilization in vinyl chloride polymers, nitrocellulose lacquers, and chlorinated rubber compounds. It imparts good flexibility at low temperature, excellent soap and detergent resistance, and low volatility loss. Paraplex G-60 lowers stabilization costs of vinyl compounds and permits high temperature processing.

Typical uses include: general-purpose film, babywear, food packaging and tubing, upholstery sheeting, coated fabric, glove-dipping compounds, flooring.

Paraplex G-61

This plasticizer is generally similar in properties and uses to Paraplex G-60. It is superior in retention of compatibility on long term exposure, has better stability against light, and is more resistant to extraction by oil.

Paraplex G-62

- *excellent stabilization against effects of heat and light*
- *good general permanence properties*
- *good resistance to soap and detergent solutions*
- *accepted by F. D. A. for food packaging*

Paraplex G-62 is a high molecular weight plasticizer which combines good permanence properties with excellent stabilization against heat and light. It has low volatility, good resistance to extraction by soap and detergent solutions, and high compatibility over a wide range of concentrations and conditions. Permits fast calendering and low stabilization costs, provides uniform color and excellent resistance to embrittlement and discoloration.

Typical uses include: general-purpose film, upholstery sheeting, coated fabric, refrigerator gasket stocks, garden hose, doll compounds, food packaging and tubing, welting, primary insulation, jacket stocks, flooring, insulation resistant to high temperature, window channeling.

Monoplex S-73

- *excellent low-temperature flexibility*
- *stabilization against effects of heat and light*
- *unusually good permanence at moderate cost*

Monoplex S-73 couples excellent low-temperature flexibility with good compatibility and low volatility, and thus offers outstanding performance over a broad temperature range. Its stabilizing effects against degradation by heat and light further extend its fields of use. Relatively low price and low specific gravity result in production economy. This low-viscosity plasticizer is particularly useful in plastisol applications where it imparts exceptional viscosity-stability.

Typical uses include: rear windows for convertible automobiles, transparent automobile seat covers, garden hose, storm-window glazing, slush-molding compounds.

Monoplex S-90E

- *electrical-grade plasticizer*
- *excellent high-temperature performance*
- *retention of resistivity after prolonged water exposure*

Because it imparts good retention of physical and electrical properties after heat aging and exposure to water, Monoplex S-90E is an excellent plasticizer for electrical insulation. In addition, this plasticizer provides unusual permanence, resistance to microorganism attack, and freedom from copper corrosion. Its low viscosity and ease of incorporation also make it useful in non-electrical applications. In dispersion compounding, it gives low-viscosity plastisols with very good viscosity-stability.

Typical uses include: high-temperature electrical insulation, dispersion compounding, tapes, gaskets, and coatings for awnings and truck tarpaulins.

Monoplex DCP

(*dicapryl phthalate*)

- *general-purpose plasticizer*

Monoplex DCP is a general-purpose monomeric plasticizer having performance characteristics, in vinyl resins, virtually identical to those of dioctyl phthalate. While it shows less resistance to extraction by oil and gasoline and lower plasticizing efficiency, Monoplex DCP withstands degradation by heat, light and outdoor exposure slightly better than dioctyl phthalate. In plastisol and organosol compounding, Monoplex DCP provides low viscosity, both initially and upon aging.

Typical uses include: general-purpose replacement for dioctyl phthalate.

ACRYLIC MODIFIERS FOR POLYVINYL CHLORIDE

Because of its low cost, ready availability, chemical inertness, high abrasion resistance, and good electrical properties, rigid polyvinyl chloride is a very useful material for fabricating a wide variety of extruded, calendered, and vacuum-formed plastic products. However, the unmodified resin has two rather serious shortcomings which restrict its usefulness—poor processing characteristics and low impact strength. These limitations are particularly true for the high-molecular-weight resins which are lower in cost, have better heat and light stability, better chemical resistance, and higher heat-distortion temperatures than their lower molecular weight and copolymer counterparts.

Rohm & Haas offers two acrylic resins, Acryloid K-120 and Acryloid KM-227, which eliminate some of the objectionable features of rigid PVC. In particular, these modifiers make possible the use of the low-cost, high-molecular-weight polymers of polyvinyl chloride in applications which were heretofore not practical. A third modifier, Acryloid KM-220, is very useful in semi-rigid compounds.

Acryloid K-120

imparts to rigid vinyls:

- ***improved processing characteristics***
- ***better heat and light durability***
- ***higher heat-deformation temperature***

Processing improvements with Acryloid K-120 begin right on the mill, where a smooth bank and faster mixing are perceptible. Further benefits are: (a) *Calendering*—faster machine speeds, better roll release, freedom from roll plating, and improved gloss, (b) *Extrusion*—better surface qualities, freedom from plating, and increased heat stability, (c) *Vacuum forming*—improved flow of the hot sheet as it is drawn into the mold. In most operations, lower processing temperatures are permitted, also, time required to rework scrap is cut to a minimum.

Acryloid KM-227

gives rigid vinyls:

- ***very high impact strength***
- ***improved processing characteristics***
- ***retention of impact strength even after considerable overmilling and reworking***

Acryloid KM-227 was developed specifically to improve the impact strength of rigid vinyl homopolymers and copolymers. An appreciable rise in impact properties is noticed even at low Acryloid KM-227 concentrations. The ability of Acryloid KM-227 modified stocks to retain impact properties after prolonged heat exposure means a reduced amount of rejects and safe reworking of scrap. Modified vinyl compounds also exhibit unusual retention of impact strength after exposure to ultraviolet light. At comparable impact strengths, compounds containing Acryloid KM-227 have better optical clarity than those fortified with other commercially available modifiers.

Acryloid KM-220

in semi-rigid formulations, confers:

- ***good low temperature flexibility, without softness at room temperature***
- ***better processing characteristics***
- ***good heat stability***

When compounds with low plasticizer levels are modified with Acryloid KM-220, they show improved low-temperature flexibility and low-temperature impact strength, and yet, they do not manifest undue softness at room temperature. Acryloid KM-220 also provides substantial improvement in milling, processing, and handling properties. In rigid vinyls, Acryloid KM-220 may be used to increase impact strength.

Typical uses for Acryloid K-120 and Acryloid KM-227 include: vinyl pipe, window frames and tracks, sliding door channels, moldings, rain gutters and spouts, automotive trim, packaging, signs and displays, chemical-resistant sheeting, contour maps, refrigerator linings, luggage, safety helmets, light diffusers, ductwork, and machine parts; trim for cameras, air conditioners, refrigerators, radios, and electrical appliances; wall paneling and covering for homes, trains, buses, and airplanes.

Typical uses for Acryloid KM-220 include: automobile crash-pad covers, films for packaging, injection-molded electrical fittings such as plugs for electrical cords.

Chemicals for Industry

ROHM & HAAS COMPANY

THE RESINOUS PRODUCTS DIVISION

Washington Square, Philadelphia 5, Pa.

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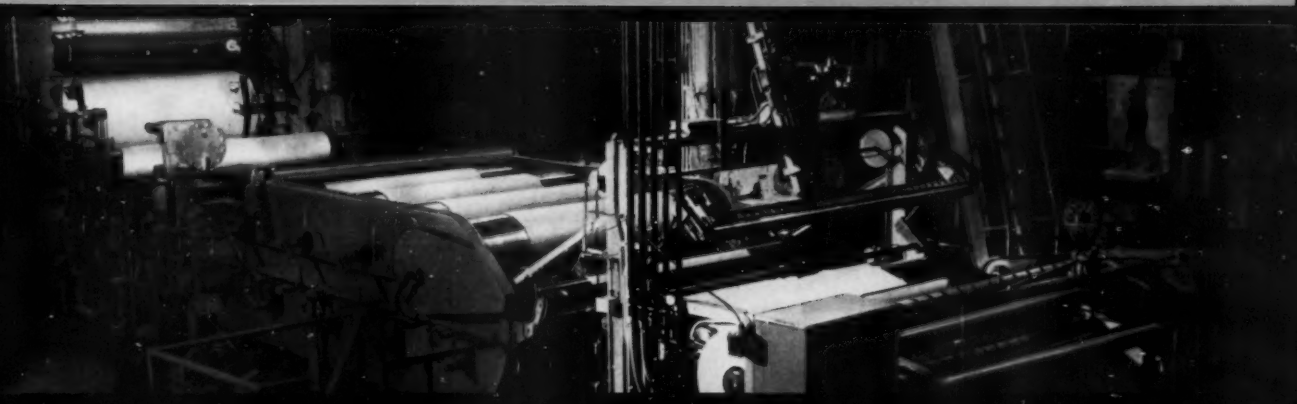

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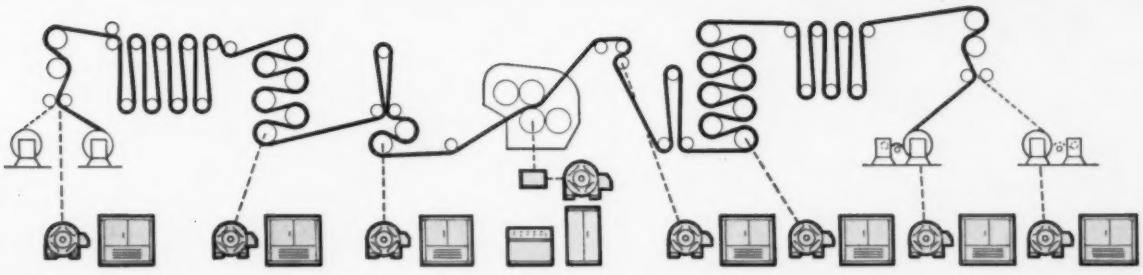

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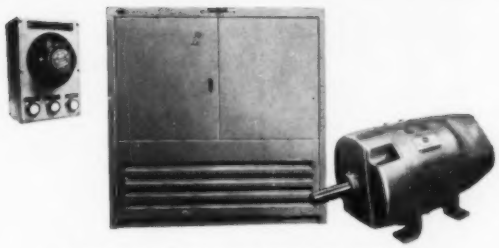

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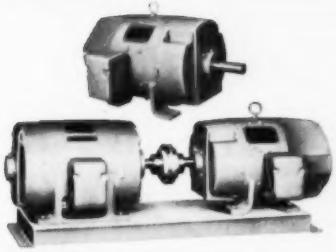

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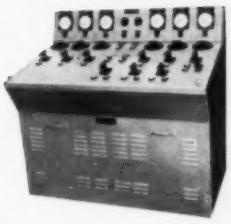

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PLASTICS* TECHNICAL SECTION

MATERIALS • PROPERTIES • TESTING METHODS AND INSTRUMENTATION • STANDARDS • CHEMISTRY

Isophthalic polyesters

By Earl E. Parker†

Commercial production of unsaturated polyester styrene resins began in 1944. Since the new industry became established, isophthalic acid is one of the very few new raw materials that has been used on a large scale for the manufacture of these resins. A comparison of the physical properties obtained from a series of experimental isophthalic polyester resins with resins containing either phthalic or terephthalic acid demonstrates that the isophthalic resins possess certain advantages over the others.

Preparation of resins

Three sets of polyesters were prepared from propylene glycol, maleic anhydride, and an isomer of phthalic acid. The unsaturated acid was varied from 100 mol % to 30 mol % in 10 mol % steps, the remainder of the acid component being an isomer of phthalic acid.

The propylene maleate phthalate series was prepared in 5-liter three-necked flasks equipped with a thermometer, an inlet tube for inert gas, and a device for the azeotropic removal of water. In most cases 20 mols of anhydride and 22 mols of glycol were refluxed with xylene as a solvent until the acid number was reduced to about 50. At this point a vigorous stream of inert gas was introduced to remove xylene and increase the molecular weight until a 60% solution in Cellosolve had a viscosity of H-J on the Gardner-Holdt scale. All polyesters were inhibited with 0.02% hydroquinone based on the charge exclusive of solvent. The finished polyesters were partially cooled, blended with styrene, and cooled to room temperature. Castings were prepared by catalyzing the resins with 1% benzoyl peroxide, heating the mixture at 130°F. until gelation took place, and then curing for 1 hr. at 170° F. and 1 hr. at 250° F.

For the terephthalate series dimethyl terephthalate and propylene glycol (22 mols) were charged to the above apparatus. An ester interchange was conducted at 365° F. with 0.03% litharge as the catalyst. After all of

*Reg. U. S. Pat. Off.
†Research Associate, Springdale Research Center, Pittsburgh Plate Glass Co.

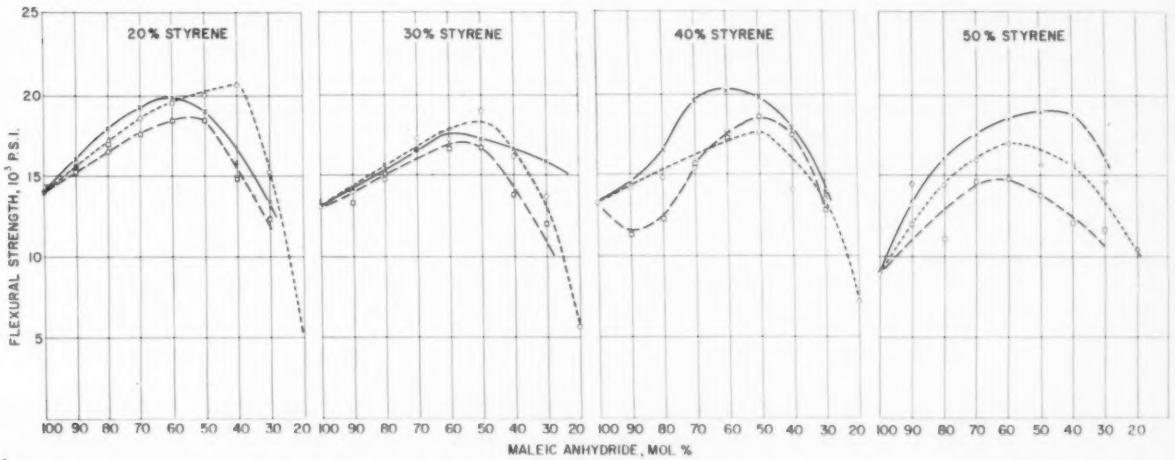

FIG. 1: Flexural strength versus composition of polyesters made with propylene glycol, maleic anhydride, and isomeric phthalic derivatives. O = phthalic anhydride; □ = dimethyl terephthalate; △ = isophthalic acid; × = dimethyl isophthalate.

the methanol was removed, maleic anhydride and xylene were added and the polyesters were completed as in the phthalic series except that polyester viscosities in the range of R-V were obtained.

Two sets of polyesters were prepared for the isophthalic series. One set was made from dimethyl isophthalate by a procedure similar to that described for the terephthalate series. The other set was prepared using isophthalic acid as a starting material. In this case the required quantity of isophthalic acid was dissolved in 22 mols of propylene glycol, and maleic anhydride and xylene were added to this solution. The polyesters were processed to the R-V viscosity range and thinned and cast in the same manner as described for the phthalic series.

Properties

In Figs. 1 to 5, flexural strength, flexural modulus, heat distortion temperature, tensile strength, and water absorption of the experimental resins are plotted against composition at four levels of sty-

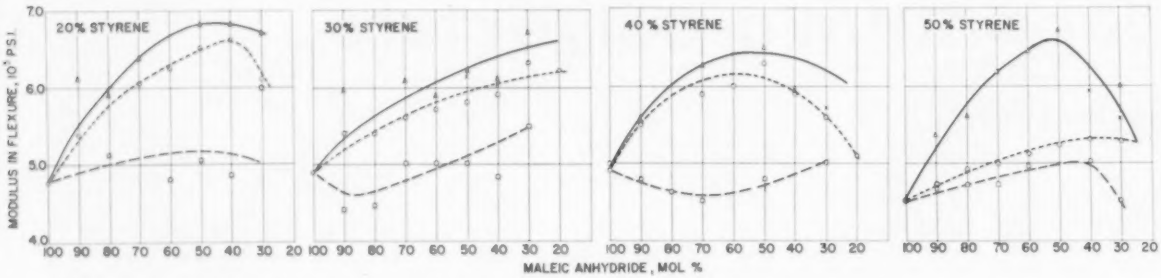

FIG. 2: Modulus in flexure versus composition of polyesters made with propylene glycol, maleic anhydride, and isomeric phthalic derivatives. O = phthalic anhydride; □ = dimethyl terephthalate; △ = isophthalic acid; × = dimethyl isophthalate.

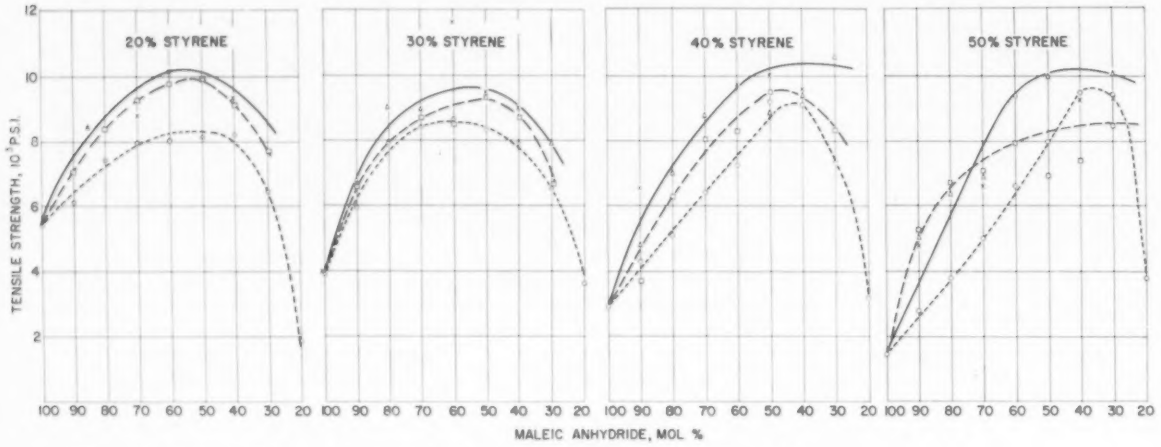

FIG. 3: Tensile strength versus composition of polyesters made with propylene glycol, maleic anhydride, and isomeric phthalic derivatives. O = phthalic anhydride; □ = dimethyl terephthalate; △ = isophthalic acid; × = dimethyl isophthalate.

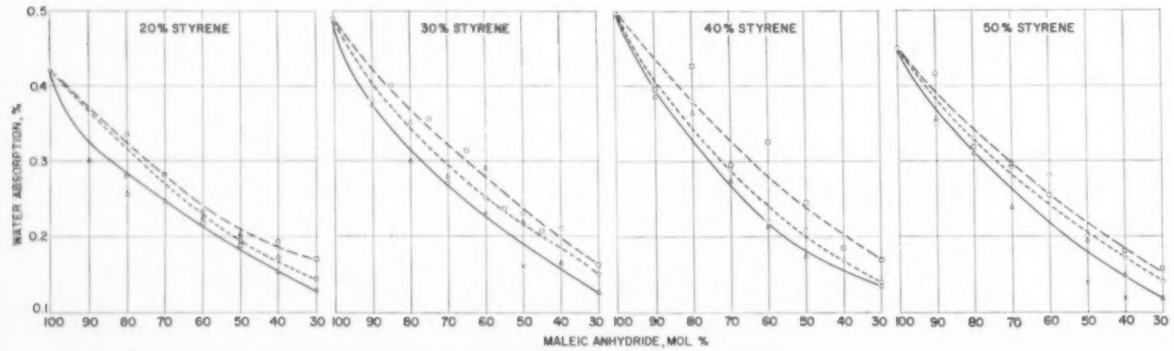

FIG. 4: Water absorption versus composition of polyesters made with propylene glycol, maleic anhydride, and isomeric phthalic derivatives. O = phthalic anhydride; □ = dimethyl terephthalate; △ = isophthalic acid; × = dimethyl isophthalate.

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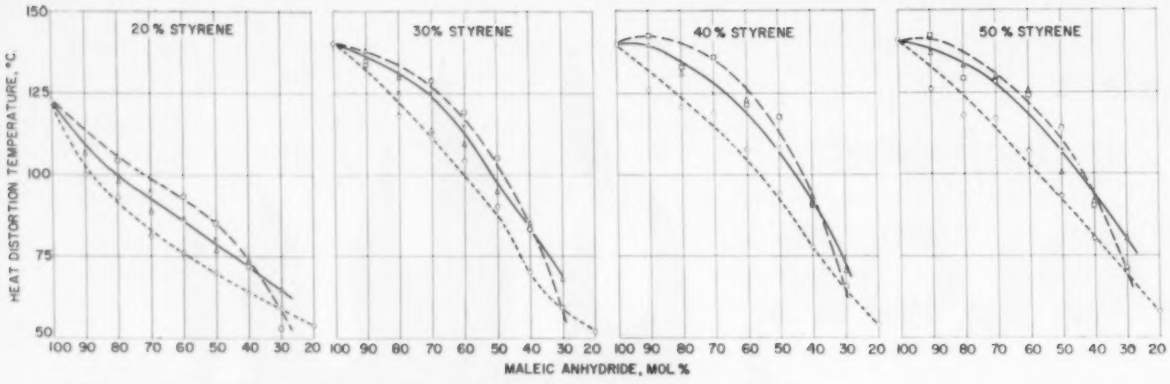

FIG. 5: Heat distortion temperature versus composition of polyesters made with propylene glycol, maleic anhydride, and isomeric phthalic derivatives. O = phthalic anhydride; □ = dimethyl terephthalate; △ = isophthalic acid; × = dimethyl isophthalate.

rene. In the isophthalic series the triangular points represent resins prepared from isophthalic acid; the "X" points represent resins prepared from dimethyl isophthalate. This work was done before large quantities of isophthalic acid were available and it was not possible to obtain data in all cases with the limited amount of material available. The data obtained from the dimethyl isophthalate polyesters were used where necessary to supplement the data obtained from resins prepared with the acid.

Fig. 1, p. 135, shows that the isophthalate series has higher flexural strengths than the others at the higher styrene levels. The flexural modulus (Fig. 2, p. 136) is highest for the isophthalic acid series at all compositions and all levels of styrene. Since the flexural modulus is frequently the limiting design factor for structural applications of polyester resin, this is a very important advantage for the isophthalic types. Tensile strengths (Fig. 3, p. 136) of the isophthalic series are also higher than the others in most cases. Water absorptions of the isophthalics (Fig. 4, p. 136) are uniformly slightly lower than those of the others. In the case of heat distortion temperatures the cure used in this work does not produce optimum values (Fig. 5, above). However, post-curing only serves to increase the advantages of the isophthalic and the terephthalic series over the phthalic series.

Applications

The advantages of isophthalic acid resins in castings is also found in glass-reinforced laminates and moldings. This makes it possible for the resin chemist to formulate isophthalic resins that will pass difficult specifications. Table I, below, shows the Chevrolet Corvette specification as compared with the properties of Selectron 5158, a polyester resin based on isophthalic acid. This specification requires high impact properties **(To page 208)**

Table I: Comparison of properties of glass fiber-reinforced Selectron 5158 with Chevrolet Corvette specification[a]

Properties	*Chevrolet Corvette specification*	*Glass fiber-reinforced Selectron 5158*	*ASTM test method*
Flexural strength, p.s.i.	20,000 minimum	35,000	D 790-49T
Modulus in flexure, p.s.i.	1.30×10^6 minimum	1.32×10^6	D 790-49T
Flexural strength, wet, p.s.i. (after 2 hr. water boil)	70% retention or 14,000 minimum	31,000	D 790-49T
Modulus in flexure, wet, p.s.i. (after 2 hr. water boil)	0.91×10^6 minimum	1.14×10^6	D 790-49T
Modulus in torsion at 180° F., p.s.i.	0.50×10^6 minimum	0.56×10^6	b
Tensile strength, p.s.i.	14,000 minimum	23,000	D 638-52T
Modulus in tension, p.s.i.	1.00×10^6 minimum	1.55×10^6	D 638-52T
Reverse impact, in.	9 minimum	10	c
Water absorption, %	0.50 maximum	0.20	D 570-42

[a] Formulation:
Resin 2.25 lb.
Clay (ASP-400) 1.00 lb.
Styrene 0.25 lb.
Benzoyl peroxide 0.02 lb.
Reinforcement:
1 ply OCF veil mat
2 plies Owens-Corning T-219B, 2-oz. glass mat
1 ply Owens-Corning T-219B, 1½-oz. glass mat
Thickness of panel: 0.10 in.
Testing atmosphere: 23° C. and 50% R. H.
[b] The modulus in torsion is run on a Tinius Olsen Torsion Stiffness Tester.
[c] No break on reverse side of test panel when impacted with a ½-lb. steel ball at a height of 9 inches.

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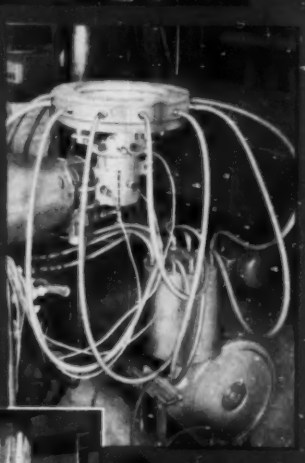

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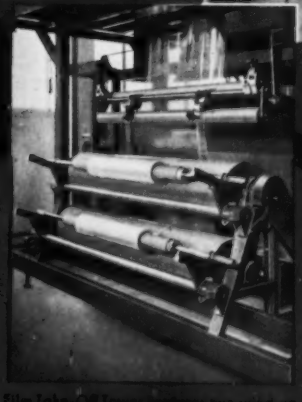

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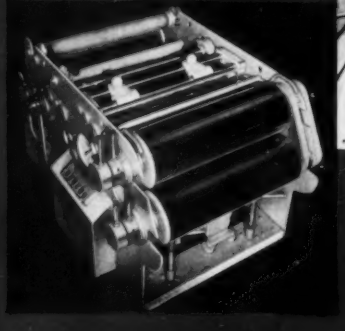

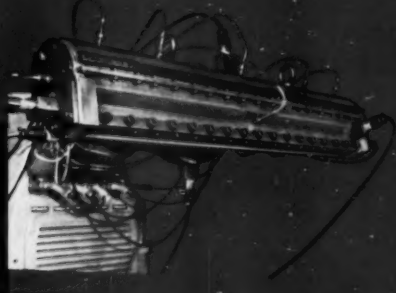

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Stress cracking of polyethylene

By U. Pelagatti* and G. Baretta*

The phenomenon of environmental stress cracking of polyethylene has, during recent years, been the center of attention of all those having interest in this material. A.S.T.M. Committee D-20 on Plastics has, in consequence, sought, on the basis of the original studies of De Coste, Malm, and Wallder (1)[1], to establish a test method to evaluate the stress-cracking behavior of different polyethylenes. In the introduction to this method (2, 3) it is explained that the results obtained are not yet entirely satisfactory, mainly because they cannot be easily reproduced in the different laboratories, and that further tests are, therefore, being carried out to overcome this shortcoming.

In view of the importance of this question, and the uncertainties which still exist, the work being done by the A.S.T.M. is being closely followed in countries outside the United States by those interested in the proper use of polyethylene. It is in this spirit that we present results of some tests made in our laboratory.

Our tests were concerned with the conditioning of the test specimen and the type of reagent used. All the other conditions prescribed in the method have been followed closely.

The tests were made with low-density polyethylenes that have very different stress-cracking resistance, even though their physical and chemical characteristics are not greatly different. These two types of polyethylene, distinguished with the letters *A* and *B*, have been chosen from among those having a melt index between 20 and 0.2, that is, the range of greatest interest from a technical point of view.

* Pirelli S.p.A., Milano, Italy.

[1] Numbers in parentheses link to references at end of article, p. 212.

In the proposed A.S.T.M. method (2) reference is made to the time required to break 50% of the specimens as a parameter for the evaluation of the resistance to stress cracking, but no indication is given of how this time is to be determined; in our tests this parameter, F_{50} in minutes, has been obtained by interpolation from the curve of the percentage of failures plotted as a function of the logarithm of time (4).

Effect of conditioning

In numerous series of tests carried out in accordance with the proposed A.S.T.M. method we have found that, whereas the test results of the same series are in general sufficiently concordant, they differ sometimes surprisingly from those of other series, even though to all intents and purposes the tests have been carried out under identical conditions, using polyethylene and reagent taken from the same source of supply. In an earlier paper (5), we dealt with the effect of different methods of conditioning the specimens and, in fact, in the paper of De Coste, Malm, and Wallder (1), precise mention is made of the thermal history of the polyethylene. It has, therefore, occurred to us that the unsatisfactory reproducibility of our results, and the insufficient reproducibility of the test results obtained by the A.S.T.M. Committee have a common cause in the choice of the method of conditioning, which may have been unsuitable or not defined in sufficient detail. Conditioning of specimens according to the proposed A.S.T.M. method (2) is as follows: "The specimens shall be submerged in boiling water for 30 min. and shall then be equilibrated to 23±1° C., as defined in A.S.T.M. D 618. The stress cracking tests shall be started within 24 hr. after the boiling water annealing has been completed."

To determine whether there was any foundation for this assumption, we carried out a great number of tests. Table 1, below, and Figs. 1 to 6, inclusive, give the most important of these test results. The slow cooling from 100° to 23° C., referred to in the table

Table 1: Effect of rate of cooling of specimens on F_{50} values

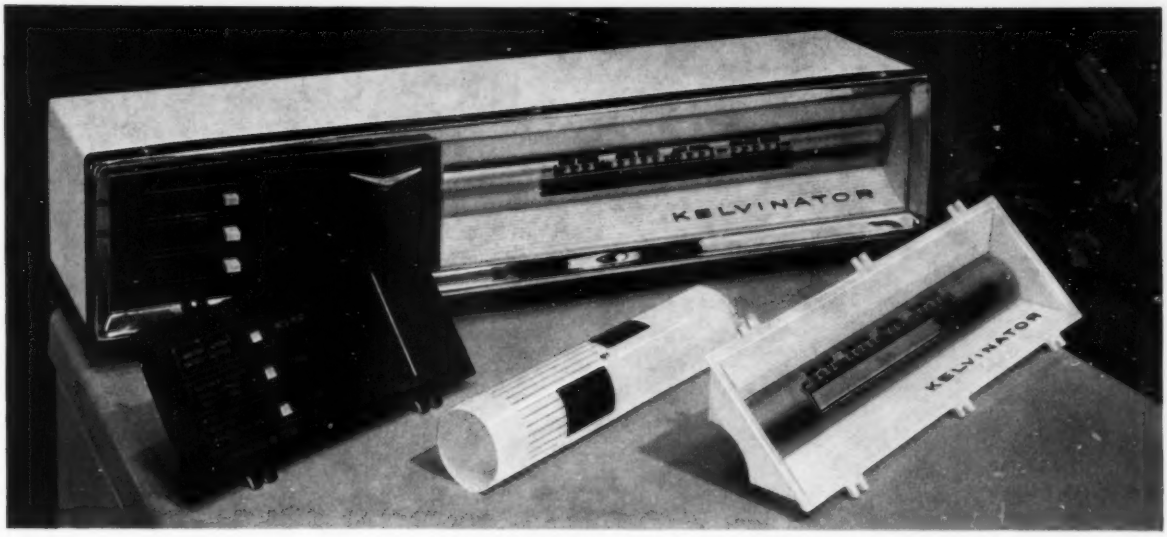
Material: Polyethylene A—melt index 2.3

Conditioning: 30 min. in distilled water at 100° C. Then cooled to 23° C. as indicated and kept at 23° C. for 24 hr.

All the other conditions of test are as prescribed in the "Proposed tentative method of test for environmental stress cracking of ethylene plastics" (2).

Cooling Method	*F_{50} Value*
Quenching for 5 min. in alcohol cooled to —25° C.	More than 24 hr.
Quenching for 5 min. in water at 23° C.	About 2 hr.
Natural cooling in air at 23° C.	About 1 hr.
Slow cooling in water (see Fig. 7)	About 35 min.
Very slow cooling in water (24 hr. to drop to 23° C.)	About 14 min.

F_{50} = Average time to break 50% of the specimens.



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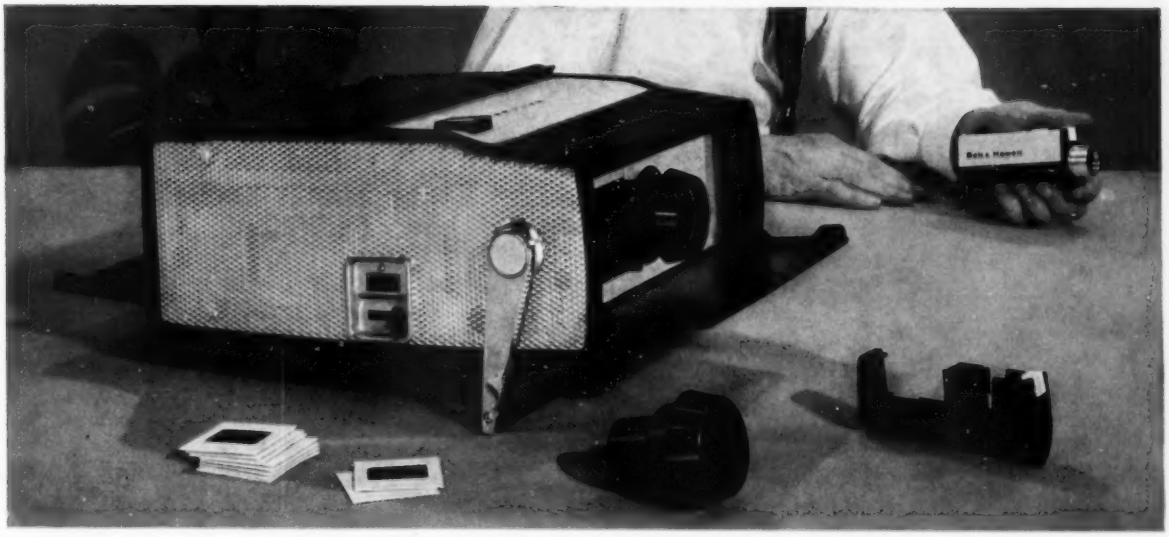

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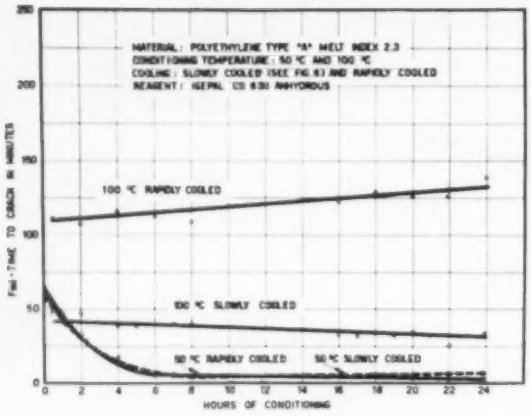
MATERIAL: POLYETHYLENE TYPE "A" MELT INDEX 2.3
CONDITIONING TEMPERATURE: 50 °C AND 100 °C
COOLING: SLOWLY COOLED (SEE FIG. 6) AND RAPIDLY COOLED
REAGENT: IGEPAL CO 630 ANHYDROUS
100 °C RAPIDLY COOLED
100 °C SLOWLY COOLED
50 °C RAPIDLY COOLED
50 °C SLOWLY COOLED
F_{50} - TIME TO CRACK IN MINUTES
HOURS OF CONDITIONING

FIG. 1: Time to crack versus hours of conditioning at 100° C. and 50° C. for type **A** polyethylenes.

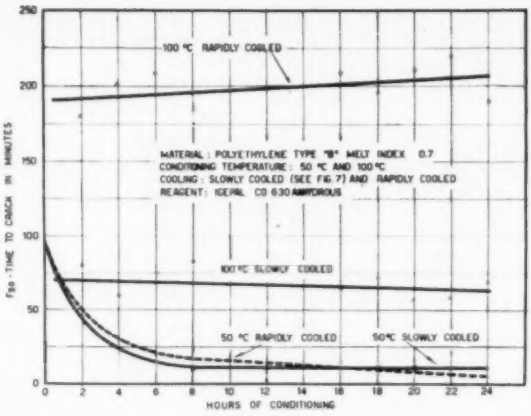
100 °C RAPIDLY COOLED
MATERIAL: POLYETHYLENE TYPE "B" MELT INDEX 0.7
CONDITIONING TEMPERATURE: 50 °C AND 100 °C
COOLING: SLOWLY COOLED (SEE FIG. 7) AND RAPIDLY COOLED
REAGENT: IGEPAL CO 630 ANHYDROUS
100 °C SLOWLY COOLED
50 °C RAPIDLY COOLED
50 °C SLOWLY COOLED
F_{50} - TIME TO CRACK IN MINUTES
HOURS OF CONDITIONING

FIG. 2: Time to crack versus hours of conditioning at 100° C. and 50° C. for type **B** polyethylenes.

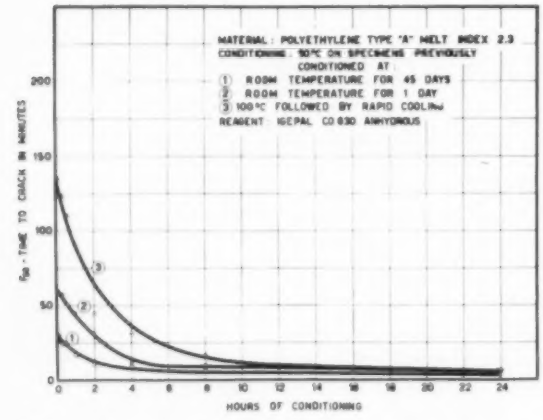
MATERIAL: POLYETHYLENE TYPE "A" MELT INDEX 2.3
CONDITIONING: 50°C ON SPECIMENS PREVIOUSLY CONDITIONED AT
(1) ROOM TEMPERATURE FOR 45 DAYS
(2) ROOM TEMPERATURE FOR 1 DAY
(3) 100°C FOLLOWED BY RAPID COOLING
REAGENT IGEPAL CO 630 ANHYDROUS
F_{50} - TIME TO CRACK IN MINUTES
HOURS OF CONDITIONING

FIG. 3: Time to crack versus hours of conditioning at 50° C. for the polyethylenes having a different "thermal history."

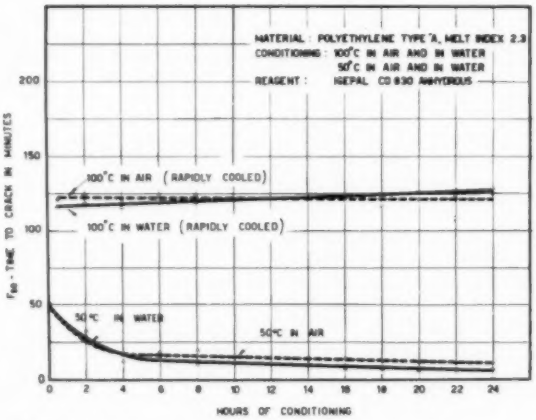
MATERIAL: POLYETHYLENE TYPE "A, MELT INDEX 2.3
CONDITIONING: 100°C IN AIR AND IN WATER
50°C IN AIR AND IN WATER
REAGENT: IGEPAL CO 630 ANHYDROUS
100°C IN AIR (RAPIDLY COOLED)
100°C IN WATER (RAPIDLY COOLED)
50°C IN WATER
50°C IN AIR
F_{50} - TIME TO CRACK IN MINUTES
HOURS OF CONDITIONING

FIG. 4: Effect of conditioning medium on the cracking time of polyethylene. Melt index for type **A** polyethylene, 2.3.

and figures, is illustrated in Fig. 7, p. 145; the rapid cooling was accomplished by quenching the specimens in water at 23° C.

The observations may be summarized as follows:

1. Conditioning, at 100° C., does not give the shortest breaking time (F_{50}) in stress-cracking tests. Considerably shorter times can be obtained by conditioning at lower temperatures; minimum breaking times occur when conditioning in the region of 50° C.

2. Stress-cracking results are not dependent on the rate of cooling of the specimen after conditioning at 50° C. However, the results are dependent on cooling rate when conditioning is carried out at 100° C., or in general at temperatures above 60° C.; in such cases the higher the rate of cooling of the specimens, the greater is their resistance to stress cracking.

3. When polyethylene is submitted to various successive conditionings, it is the last treatment to which it is submitted that determines the stress-cracking results. For example, the higher resistance of specimens conditioned at 100° C. is nullified by a later treatment at 50° C.; vice versa, the low values of F_{50} resulting when conditioning at 50° C. are raised if the specimens are afterwards treated at 100° C. However, to nullify the effects of treatment at the higher temperature it is necessary that the specimens be conditioned at the lower temperature for several hours; in the inverse case only a few minutes are sufficient.

4. The effects of previous conditioning at temperatures other than 50° C. are never completely eliminated during stress-cracking tests at this latter temperature. This may appear reasonable at very high breaking rates of the specimen, but it is less easily explained in tests lasting a longer time. This phenomenon may be due to the fact that the specimens are flat when submitted to the conditioning treatment but are bent when the stress-cracking test is carried out.

5. Quite apart from the temperature applied, the time of conditioning above a certain minimum has practically no effect on the F_{50} value of the specimens (Figs. 1 and 2). As previously mentioned in Point 3, this minimum time is very short when the

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specimen is conditioned at a high temperature (100° C.), whereas it is longer at the lower temperature (50° C.). In this latter case, the conditioning time is closely related to the previous thermal history of the material (see Fig. 3).

6. Conditioning in water or in air does not affect the results provided, of course, that it has been carried out at the same temperature and cooling conditions (Fig. 4).

7. In regard to conditioning, the behavior of polyethylenes *A* and *B* is relatively the same. However, when the treatment is more severe, that is at 50° C., all grades of polyethylene *B* give reasonably short F_{50} values, but type *A* with a low melt index (≤ 0.7) does not break even after a long time (336 hr.) (Figs. 5 and 6).

From these data and observations, the following conclusions can be reached:

1. If the specimens are to be conditioned at 100° C. as prescribed in the proposed A.S.T.M. method, then in order to improve the reproducibility of the results, it is essential that the cooling rate of the specimens after the thermal treatment be more definitely specified.

2. Conditioning at 50° C. is to be preferred to conditioning at 100° C. for the following reasons: a) It gives more reproducible results, even without the necessity of taking special precautions in cooling the specimens. b) It reduces the test time so that type *B* polyethylenes of low melt index values can be classified completely. c) It tests polyethylene at its most critical condition in regard to stress cracking, and the results obtained are, therefore, of particular significance for practical purposes. d) The specimens are conditioned at the temperature used in the stress-cracking test; hence there is no danger of structural alterations which might occur in the polyethylene during the test, and many doubts on the interpretation of the values obtained are, therefore, eliminated.

It is not easy to explain why the different conditioning treatments influence the resistance of polyethylene to stress cracking. It was at first thought that this might be due to a difference in the percentage of material in the crystalline state, but X-ray tests made on several specimens of the same polyethylene conditioned in various ways have shown that these differences are so small as to

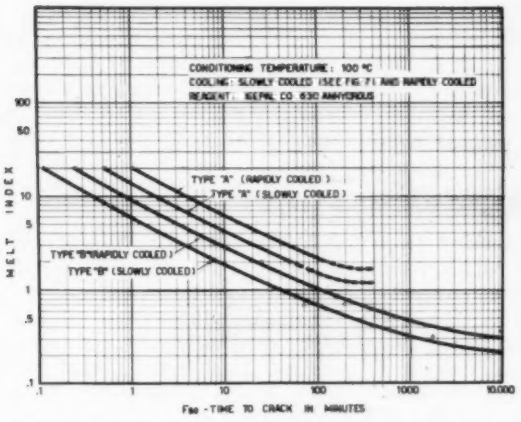

CONDITIONING TEMPERATURE: 100 °C
COOLING: SLOWLY COOLED (SEE FIG. 7) AND RAPIDLY COOLED
REAGENT: IGEPAL CO 630 ANHYDROUS
TYPE "A" (RAPIDLY COOLED)
TYPE "A" (SLOWLY COOLED)
TYPE "B" (RAPIDLY COOLED)
TYPE "B" (SLOWLY COOLED)
MELT INDEX
F50 - TIME TO CRACK IN MINUTES

FIG. 5: Effect of melt index on the time to crack for **A** and **B** polyethylenes, which were conditioned at 100° C. and differently cooled.

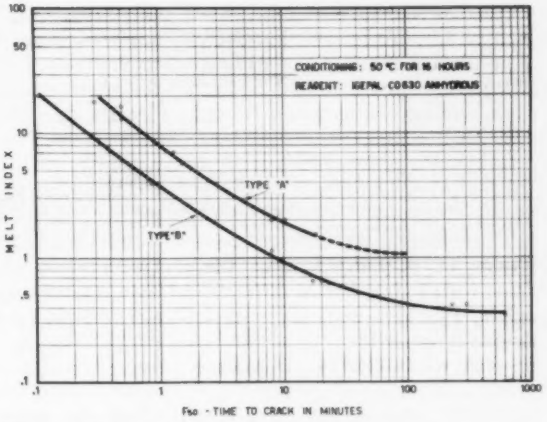


FIG. 6: Effect of melt index on the time to crack for types **A** and **B** polyethylenes in anhydrous Igepal CO 630.

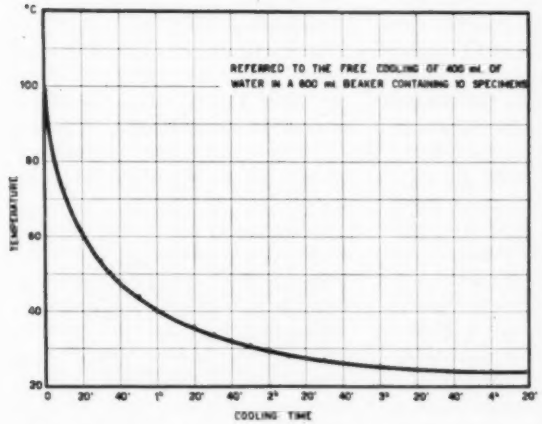


FIG. 7: Curve of "slow cooling" of the polyethylene specimens.

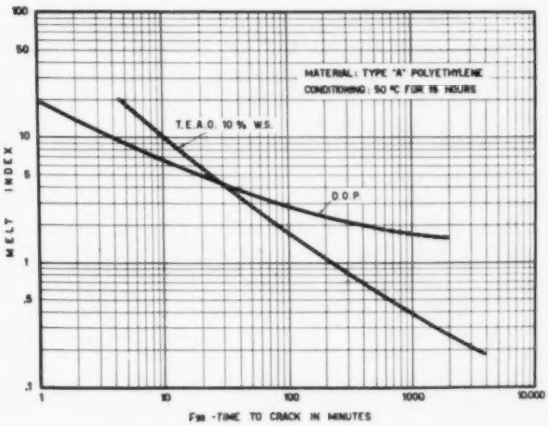


FIG. 8: Effect of melt index on cracking time using two different reagents.

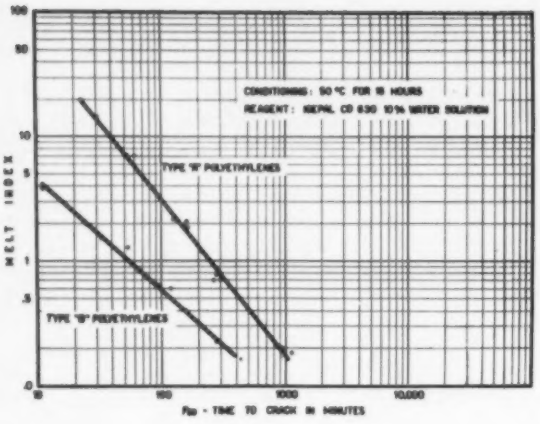


FIG. 9: Effect of melt index on time to crack for **A** and **B** polyethylenes in a 10% aqueous solution of Igepal CO 630.

make it unlikely that they will have any effect. The same can be said for the variation in flexural modulus of elasticity. It was also thought that this phenomenon might be attributable to the difference in the size of the crystals, but so far we have no confirmation of this. We believe, however, that the influence of the cooling rates of specimens conditioned at temperatures higher than 60° C. is closely related to the solidification of the liquid phases certainly present in polyethylene at these temperatures.

The cause of the different behavior of polyethylenes of the same melt index, but of different origin, to stress cracking is undoubtedly complex. It is, however, probably related to structural aspects of the molecular chains; in addition, different molecular weight distribution with the same molecular weight average may exercise some influence.

Effect of reagents

The reagent (Igepal CO 630) prescribed in the proposed A.S.T.M. method does not break some types of polyethylene of low melt indexes, even if the test is allowed to continue for a considerable time.

Many products exist, generally aqueous solutions of surface-active agents, that are capable of breaking these same polyethylenes in a relatively short time, even in their lowest melt indexes. We consider this to be a serious drawback in the proposed A.S.T.M. method because the polyethylenes will not be tested at the most severe conditions to which they may be subjected.

The relatively weak action of Igepal CO 630 is due to the fact that, according to the proposed A.S.T.M. method, it is used in the anhydrous state. In this condition it cannot exert the function of a surface-active agent, which is mainly responsible for activating the phenomenon of stress cracking. Its action is instead based on another, not well defined phenomenon, similar to that produced by many very different liquids, polar or not.

In other stress-cracking tests (5), the results of which have been recently confirmed on specimens conditioned at 50° C., a distinct difference was shown between the action of surface-active agents, which are normally used in aqueous solutions, and that of other organic reagents in an anhydrous condition. Fig 8, p. 145, shows the time to break (F_{50}) for a type *A* polyethylene conditioned at 50° C. as a function of the melt index, for two different reagents which we normally use for tests of this kind: D.O.P. (di-2-ethyl hexylphthalate), which is insoluble in water and was used in the dry state, and T.E.A.O. (triethanolamine oleate), a surface-active agent, which was used in a 10% solution in distilled water. From this figure and Figs. 5 and 6, it is seen that the 10% liquid solution of T.E.A.O., contrary to D.O.P. and Igepal CO 630 used dry, breaks the type *A* polyethylenes even at their lowest melt index in a reasonably short time; they can thus be exactly classified.

On the other hand, with polyethylenes of high melt index, which in any case have a very rapid breaking time, the action of T.E.A.O. is a little slower than that of D.O.P. and dry Igepal CO 630. This confirms that the effect of Igepal CO 630 in a dry condition on stress cracking is more similar to that of substances having entirely different characteristics (in this particular case D.O.P.), than to another surface-active agent, or specifically, that of T.E.A.O.

On the basis of these considerations, the tests prescribed in the proposed A.S.T.M. method were repeated using Igepal CO 630 in a 10% distilled water solution, instead of anhydrous. For these tests polyethylene conditioned at 50° C. was used; the results are given in Fig. 9, left. Examination of this figure, and also Fig. 8, leads to the following observations:

1. A 10% aqueous solution of Igepal CO 630 behaves in the same way as a 10% aqueous solution of T.E.A.O.; in all probability the mechanism governing the action of these two surface-active agents is in this particular case the same.

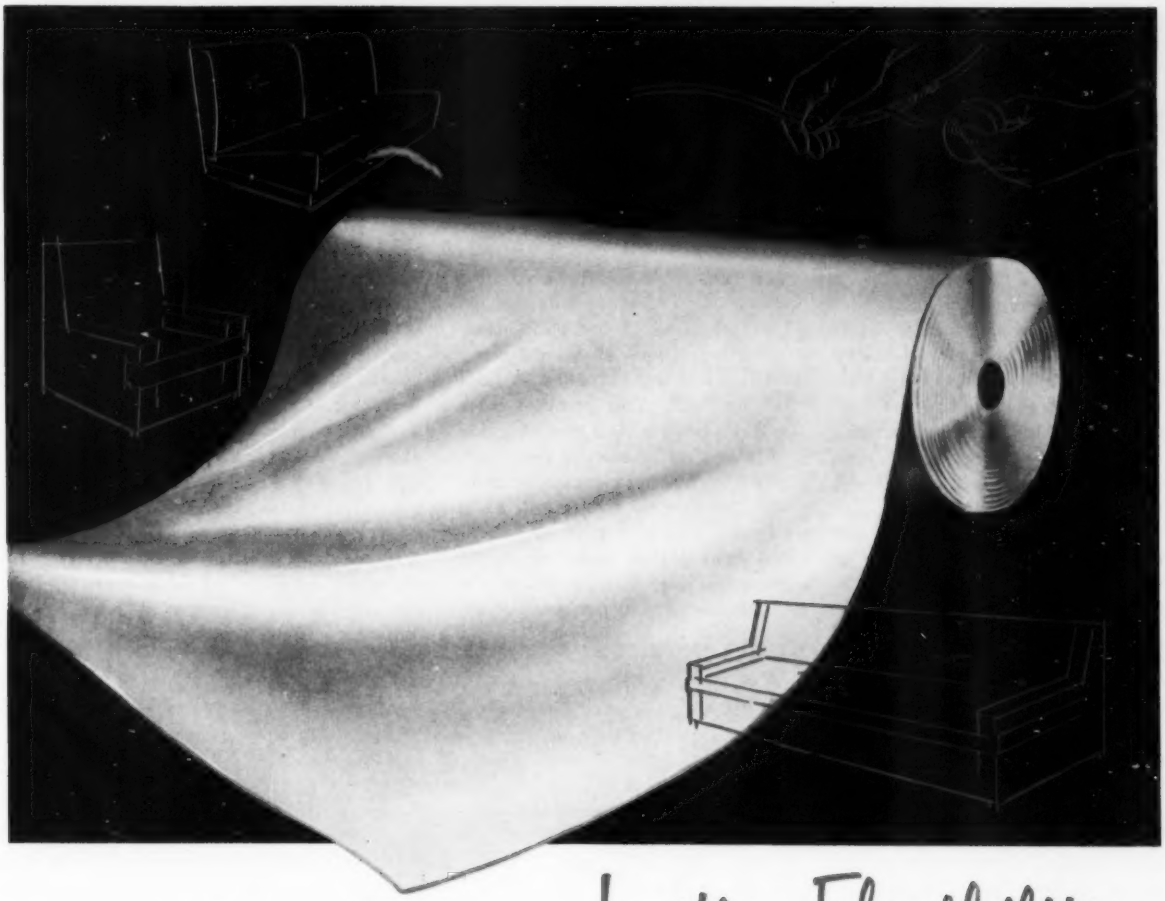
2. The logarithmic plots (Figs. 8 and 9) of the melt index versus F_{50} for the two surface-active agents used in aqueous solution give practically straight lines, indicating, therefore, that the phenomenon is regulated by a definite law.

When Igepal CO 630 is used dry, on the other hand, these curves are less clearly defined, probably because the phenomenon is more complicated (Fig. 6).

3. When Igepal CO 630 is used in an aqueous solution there is, similarly to when it is used dry, a decided difference in its action with type *A* as well as type *B* polyethylenes that have the same index.

4. With a 10% aqueous solution of Igepal CO 630—contrary to its behavior when used dry, and similarly to the results obtained with an aqueous solution of T.E.A.O. and other surface-active agents—it is possible to reach failure, even on low melt index type *A* polyethylene within a reasonable length of time. **(To page 212)**

Admex Product-of-the-Month



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Pink discoloration of vinyls

By T. A. Girard† and C. F. Koda‡

What causes the problem and how it can be overcome

The coated fabrics industry is currently experiencing difficulties with pink discoloration of white and pastel shades of vinyl-coated fabric and unsupported vinyl film. The initial reports from the field seemed to indicate a microbial causative agent, since the coloration could be obtained in soils and in outdoor exposure. Other reports of pink discoloration have been received which appear to result from inadequate stabilization. In these instances, the discoloration is reported as a mass effect rather than the spotty or blotchy discoloration noted in the present case.

The incidence of pink discoloration covers a wide variety of finished goods. Such materials as white convertible car tops, chaise longue pads, vinyl covered boat cushions are but a few of the goods affected. In most instances, where discoloration occurred after outdoor exposure, the greatest concentration of discoloration was found along the seams and hems where dirt accumulates, although in some cases the pinking was equally distributed over the surface of the product.

An extensive research program was undertaken to determine the cause of the pink discoloration, and to provide an adequate means of control. This report summarizes the work to date.

Factors investigated

In the initial phases of the investigation, attempts to duplicate the pinking phenomenon by methods reported in the field were negative. Heating of the vinyl for 48 hr. at 212° F. in an oven or on the calender at 350 to 400° F. did not produce the discoloration. The type of stabilizer used also appeared to have no influence on the formation of the pink color.

Ten variations of a base vinyl composition were applied to fabric for test. The compositional variations were such that only the resin and the plasticizer remained constant for all samples, and it was possible to assess individually the effects of pigment, filler, and the various types of stabilizers used for these products.

The samples so prepared were subjected to incubation for six weeks in solutions of various mineral salts commonly found in the soil. None of these produced evidence of discoloration.

However, when the vinyl compositions were buried in soil, all samples showed comparable pink discoloration. Further tests in several different soils demonstrated that some soils would cause discoloration while others would not. Analysis of these determined that the demarcation between those producing discoloration and those not producing discoloration was the pH of the soil. A soil of pH 5.8 will produce the discoloration, whereas it does not develop in a soil of pH 7.1.

To further establish that chemical composition of the soil was not an influencing factor, and to confirm the suspicion that the cause of staining resulted from some microorganisms, the several soil samples were placed in an autoclave and sterilized. Burial tests in the sterile soils indicated that discoloration would not result irrespective of specific soil composition or pH.

Causative agent

Microbiological evaluation showed the presence of a fungus identified as a species of Penicillium in all of the soil samples. This microorganism was isolated and it was found that in acid environment it produced a pink to red colored pigment, while in an alkaline environment it produced no color. The results of these varied microbiological studies showed that the principal causative agent of the pinking may be attributed to this fungus, although other microorganisms can produce similar discoloration. The biochemical activities of fungi are covered by many factors which influence their rate of growth, morphology, products of fermentation, etc. In the case of the Penicillium species, pigment formation was influenced by the pH of the substrate. In a neutral or alkaline environment, although the organism continues to grow, it is unable to produce the pink pigment.

Overcoming the problem

Upon determination that the discoloration was indirectly of microbial origin, ways and means were sought to control microorganism growth. It was found that treatment of the base fabric with Fungitrol 100 WD at 2% compound deposition, and treatment of the vinyl composition with Nuodex 100 VT at 2.5% compound, prevented the growth of the Penicillium species. It should be borne in mind that it may be possible for the pigment to be physically transferred to a treated sample from the growth of the fungus on organic debris present in close proximity to the vinyl or fabric surface. At present there is direct evidence that the use of the fungicide will so influence the total environment that the organism will not grow in close proximity and the possibility of staining as a result of pigment transfer, will be notably reduced.—**End**

†Assistant Director, Research and Development, and ‡Chief, Microbiological Laboratory, Nuodex Products Co., Elizabeth, N.J.

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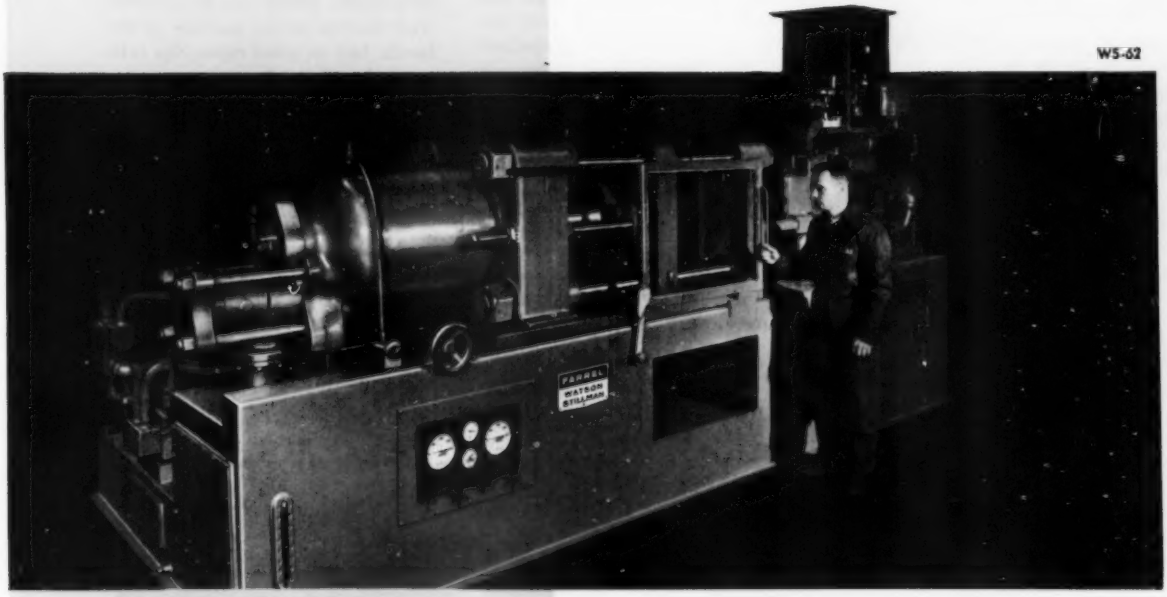
W5-62



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COMING SOON . . . SOMETHING NEW IN PREPLASTICIZING

Microscopic study of expandable polystyrene bead, prepuff, and foam

By Ruth Giuffria*

The morphology of expandable polystyrene bead, prepuff, and foam was studied microscopically. As a result of this study, a technique for producing thin cross sections of expanded bead foam was developed.

Expandable polystyrene beads contain a propellant gas which expands on heating and forms many small cells in the beads. These expanding beads can fill a mold to produce a material of many desirable structural and insulating properties with densities from ½ to 20 lb./cu.ft. There is little literature information concerning the morphology of these beads and foams produced from them, so this microscopical study was undertaken to illustrate some of their characteristics.

Beads

Figure 1, below, shows four samples as received from the manufacturers. The upper two were from the same manufacturer; the lower two were from different manufacturers. The variations in size and shape which are apparent here existed because much of this material is still in an experimental stage. The inclusions in the beads were believed to contain the propellant gas. The beads were uniformly hard throughout, exhibiting no evidence of any sort of skin.

If the beads were allowed to expand on a Kofler hot stage, it was possible to observe, with the microscope, their process of expansion. At 60 to 70° C. there was a perceptible change in the bead's refractive index caused by small expansion of the propellant inclusion and the inception of new inclusions. At 100° C. the bead's expansion was quite obvious; cells began to form. As expansion progressed, some of the surface cells ruptured leaving open cells on the bead's surface. At 150 to 200° C. the beads melted and fused.

Figure 2, p. 152, is a photomicrograph of a razor blade section of an expanded bead. Each bead was a honeycomb-like structure formed by the expanding propellant. There was no discrete wall formed at the surface of the beads, but, in some cases, the cells at the bead's surface were smaller than those in its center.

Prepuffs

In the production of foams, beads are prepuffed to certain densities before they are placed in the molds. This insures better final expansion and is more economical of material. Figure 3, p. 152, shows photomicrographs of prepuffs of three densities along with their cross sections;

*Chemistry Laboratory, Major Appliance Laboratories, General Electric Co., Louisville, Ky.

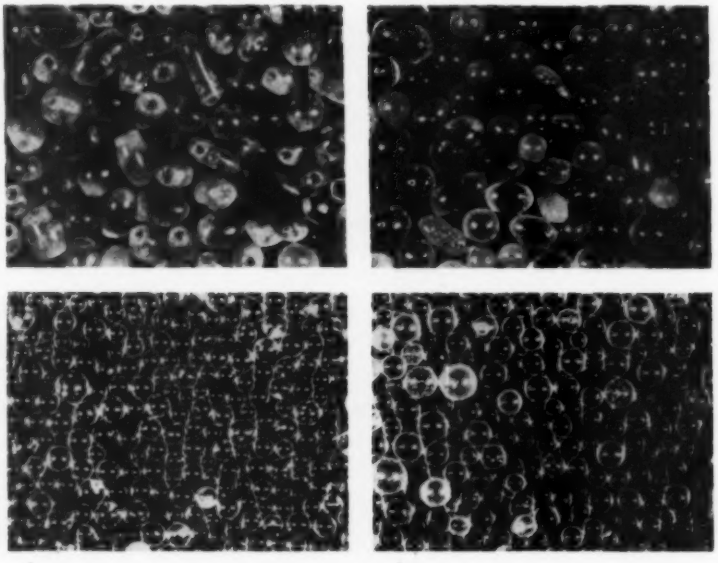
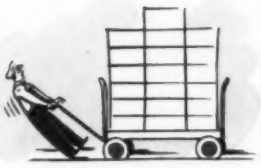


FIG. 1: Four samples of expandable polystyrene beads under four-power magnification. Inclusions in beads were believed to contain the propellant gas.

Another example of FIBERITE at work...

Wheel hubs of Fiberite Phenolic



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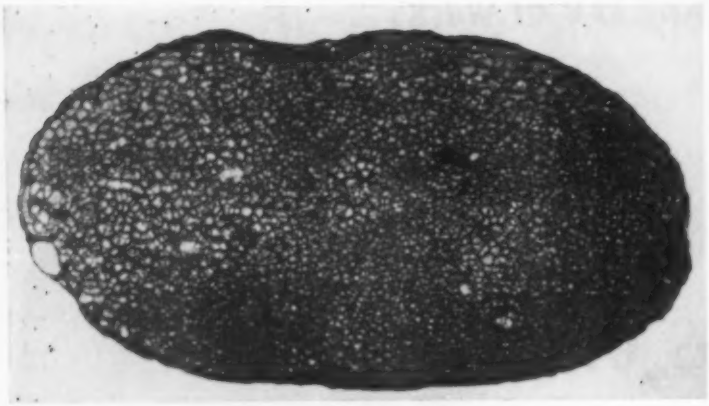


FIG. 2: Photomicrograph of a razor blade cross section of an expanded bead under 25-power magnification.

lower density prepuffs had smaller cell sizes.

The prepuffed beads are placed into molds where their full expansion is produced by further application of heat. When expansion is complete, the mold is cooled and the molded part removed.

Foam

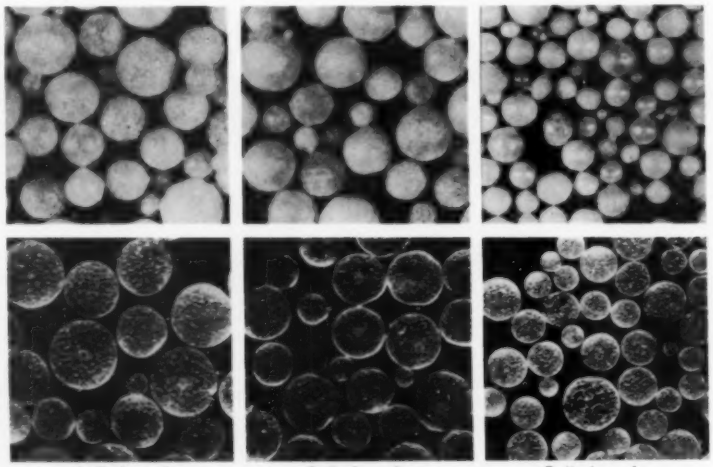
Because of its honeycomb-like structure, it was not possible to section foam by conventional techniques. Good microtome sections were obtained by a technique of embedding each section before it was cut. A foam block approximately 1 in. square was placed in the microtome vise and thick sections cut until a good face was obtained. This surface was coated with a 25% solution of polyvinyl alcohol (PVA) thick enough to give strength to the section as well as to completely fill the open cells to support the cell walls. When the PVA had dried, the microtome advance was operated manually and a 25-micron section was cut. It was necessary that the microtome knife be oriented so that it was drawn across the section at an angle and operated in a slicing motion so as not to tear the delicate cell walls.

The sections were placed on water in a Petri dish and the PVA dissolved. Addition of Congo Red in the preparation of the PVA made it easy to determine when all of it had dissolved. Sections prepared in this manner, dried, and mounted in a low-viscosity oil under vacuum, were suitable for microscopic study.

Figure 4, below, is a group of photomicrographs of sections of foams of various densities. The expanded bead foam is a two-component system, expanded beads containing their expanded cells. There was considerable variation in cell size as well as extent to which individual beads expanded. However, there existed a correlation between foam density and cell size, the higher density foams having smaller cell sizes. The average cell diameter of foams examined was of the order of 80 to 150 microns. The cell walls were 1 to 1.5 microns thick.

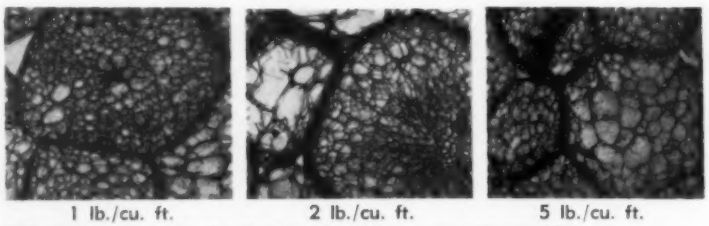
No discrete cell wall existed around individual beads, but there were some exceedingly small cells at the point where contact of bead was made with its neighbor.

Voids existed throughout the foams where, in expansion, beads failed to make contact with one another. These voids were larger and more numerous in lower density foams.—**End**



1 lb./cu. ft. 2 lb./cu. ft. 5 lb./cu. ft.

FIG. 3: Photomicrographs of polystyrene bead prepuffs of three different densities, along with their cross sections, under 2.6-power magnification. Lower density prepuffs had smaller cell sizes.



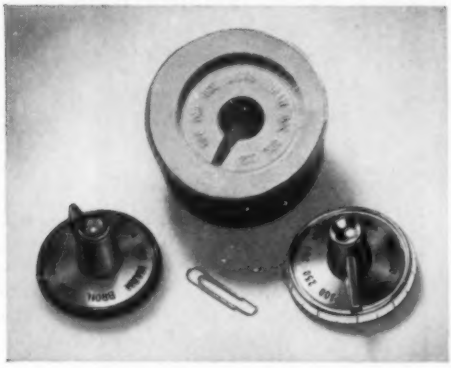
1 lb./cu. ft. 2 lb./cu. ft. 5 lb./cu. ft.

FIG. 4: Cross sections of polystyrene bead foam, magnification 7X. The 2 lb./cu. ft. foam appears to have larger cells than does the 1 lb./cu. ft. foam. However, the many small cells around the circumference of the beads in the former probably account for the higher density. Cell walls were 1 to 1.5 microns thick.

New savings in time and expense: This epoxy coil-winding form is easily removed from a flexible RTV silicone rubber mold which took less than 2 hours to make. Total cost dropped from $86 per pair in hardwood to $16 per pair in plastic. Delivery was cut from 3 weeks to 2 days.

General Electric RTV silicone rubber opens up new fields in tooling and model making

Flexible, needs no parting agent, low shrinkage, duplicates glossy surfaces and fine detail



High-quality prototypes: RTV (room temperature vulcanizing) silicone rubber accurately reproduces surface finish and fine detail. This prototype control knob and other more complicated parts are easily removed from molds without using parting agents. Shrinkage less than 0.2%.

Precision, low-cost tooling: Previously machined from plastic laminate at a cost of $175 each, this fixture is now produced in a two-piece RTV mold at a saving of over $150 per part!

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For application data on RTV silicone rubber write General Electric Company, Silicone Products Dept., Section G1659, Waterford, New York.

GENERAL ELECTRIC

Silicone Products Dept., Waterford, N. Y.

NEW DEVELOPMENTS

Many minds at work on new ways to use plastics, new designs, and new product concepts offer ideas you can use.

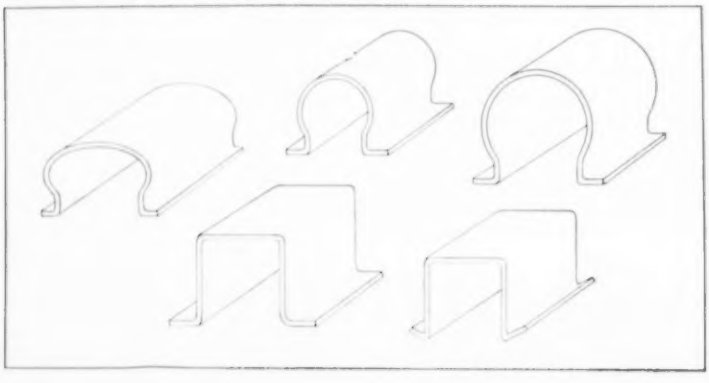
Clips that replace blister packs

A new, money-saving approach to the display of carded merchandise is offered by "invisible staples," introduced by Anchor Plastics Co., Inc., Long Island City, N. Y. The "staples" are actually acetate or butyrate clips cut to any desired length from contoured extrusions. In use, the clips are snapped through a die cut hole in the card and the item to be displayed is then inserted through the opening formed by the clip. Tension provided by the clip holds the product securely in place. Integral flanges prevent pullout. Among carded items particularly suitable for this technique are pens, lipstick cases, tubes, small containers, and the like. The extrusion is contoured to follow the shape of the item to be "stapled."

Cost of the clip varies with size and shape, but goes as low as ½¢ each, as for example the top center clip in the diagram below. According to Anchor, the clips can be incorporated in automatic carding operations. The company also states that clip-assembled carded items compare very favorably in cost with blister packs. Several clip designs currently supplied are shown in cross section in diagram below. These, as well as others, are made to order in quantities to customer specs. Any color and clear are offered. Current users are pen and pencil makers and cosmetic manufacturers.

TYPICAL PRODUCTS carded with plastic clips. Clips are practically invisible on cards, have been highlighted at top.

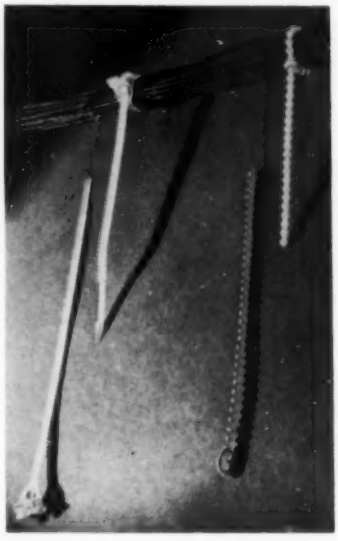
SEVERAL DESIGNS currently supplied include round, square, and oval shapes. All designs are extruded to order.



How to bundle wire

Tying bundles of electrical conductors into compact groups or harnesses with cord or string, long established practice, is time-consuming and, therefore, costly; supporting cables for mechanical protection presents equivalent problems. Now, three new products have been introduced that offer the electrical industry new methods of doing these old jobs quicker, easier, and more efficiently.

Wire ties. Reduction of 30% in the time required to tie bundles of wire with cord is claimed for the wire tie offered by Westinghouse Electric Corp., Component Products Dept., East Pittsburgh, Pa. Molded of nylon-based Moldarta material, this tie has a long flexible tongue with ratchet-like teeth which, when the tongue is inserted into the integral buckle of the tie, are gripped firmly by a double tooth molded into the buckle. The tongue is simply wrapped around

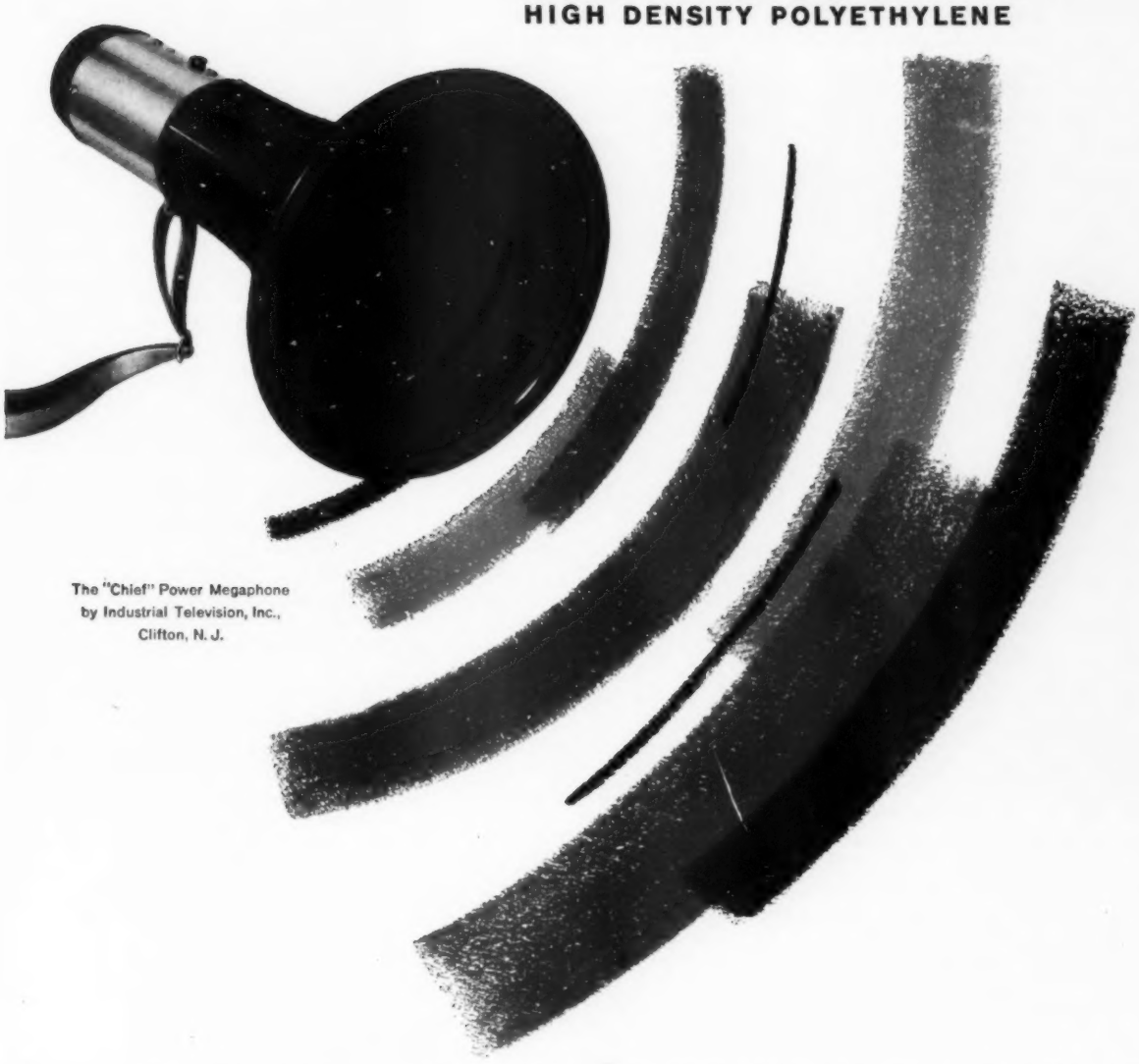


the wires, slipped into the buckle, and pulled up snuggly to form a strong, permanent tie in seconds.

Another plastic unit for the same purpose, called E-Z Wire Tie, is produced by Richco Plastic Co., Chicago, Ill. These ties are molded of polyethylene in one piece and consist of a bead-like tongue which is passed through a hole in the buckle, pulled tight, and locked by being forced through a short **(To page 156)**

Packs brilliant power...
works in any weather...amazingly light...
made of GREX®

HIGH DENSITY POLYETHYLENE



The "Chief" Power Megaphone by Industrial Television, Inc., Clifton, N. J.

The human voice can be projected enormous distances with this new, self-contained "Chief" power megaphone. Yet the entire unit—components and casing together—weighs under four pounds!

Why was GREX chosen for the casing? Industrial Television, Inc. gives three principal reasons:

GREX high density polyethylene makes a rugged lightweight molding; rigid and unyielding. GREX is weatherproof, rustproof, corrosionproof. Great heat or cold can't harm it. Thus the megaphone can be used where the going is rough: fires, police emergencies, storms . . . as well as on boats, athletic fields, beaches, playgrounds. And it's available at an attractively low price, thanks in part to this versatile plastic.

New markets can open for *you*, when GREX comes into your production picture. It costs nothing to learn how. Why not inquire today?

W.R. GRACE & CO.
POLYMER CHEMICALS DIVISION
225 ALLWOOD ROAD, CLIFTON, NEW JERSEY
3555 W. PETERSON AVENUE, CHICAGO 45, ILLINOIS

(From page 154)

slot into a smaller hole in the buckle. They can be instantly removed for repairs or adding more wires to the bundle, and reused.

Cable hangers. Replacing metal straps (which might cut the insulation) and cord or other suspensions (which take time to install), Straplock hangers, molded of nylon by Whitso, Inc., Schiller Park, Ill., have the added advantage of instant mounting and

locking in holes in bulkheads, dash boards, and the like.

The one-piece Straplock hanger has a double head with molded-in flutes and a tongue with two molded-in holes. In assembly, one side of the head is pressed into a mounting hole, the tongue is passed around the cable, and one of the tongue holes is pressed over the flutes of the other side of the head. Both sets of flutes deflect under pressure; tendency to return to original shape makes strong gripping effect.

To all three of these applications, plastics bring good mechanical strength, resistance to deterioration, and—of greatest importance in many uses—excellent electrical insulation.

Phenolic wheel tread

Stronger and cheaper than rubber, and designed to exceed the rigid sanitation standards of the baking and food processing industries, a new phenolic wheel tread for casters on materials handling equipment has been announced by Aerol Co., Inc., Los Angeles, Calif. Compression molded of macerated fabric-filled phenolic by Peerless Plastics Co., Culver City, Calif., the new treads are completely sealed to aluminum wheels during the molding process. Because of the completeness of the seal, there are no bacteria-breeding crevices and the wheels can easily be steam-cleaned.

The phenolic tread, called Neo-Seal, will withstand a load of 350 lb. on a 6-in. wheel. It is also impervious to deterioration when exposed to lard, shortenings, and other agents encountered in bakery and food plants.

Encapsulated inductors

Radio frequency inductors encapsulated in Bakelite epoxy are now being used in radar and electronic computers built by International Business Machines Corp., Kingston, N. Y. The equipment is part of the DEW (Defense Early Warning) line system currently in operation in northern Canada, as well as along the southern perimeter of the arctic region.

Epoxy was selected to form the

ENCAPSULATED in epoxy resin, these radio frequency inductors for I.B.M. equipment meet strict engineering specifications for physical, electrical, as well as chemical properties.

encapsulating material in this application because of the cost savings it makes possible and for its superior physical, electrical and chemical properties. A rubber-based material previously used was discontinued because it involved a difficult manufacturing process which costs twice that of the epoxy encapsulated unit, according to the manufacturer of the units, Fugle-Miller Laboratories, Clark, N. J.

These components surpass strict engineering specifications set up by I.B.M. for radio frequency inductors in non-magnetic, non-metallic cases. **(To page 158)**

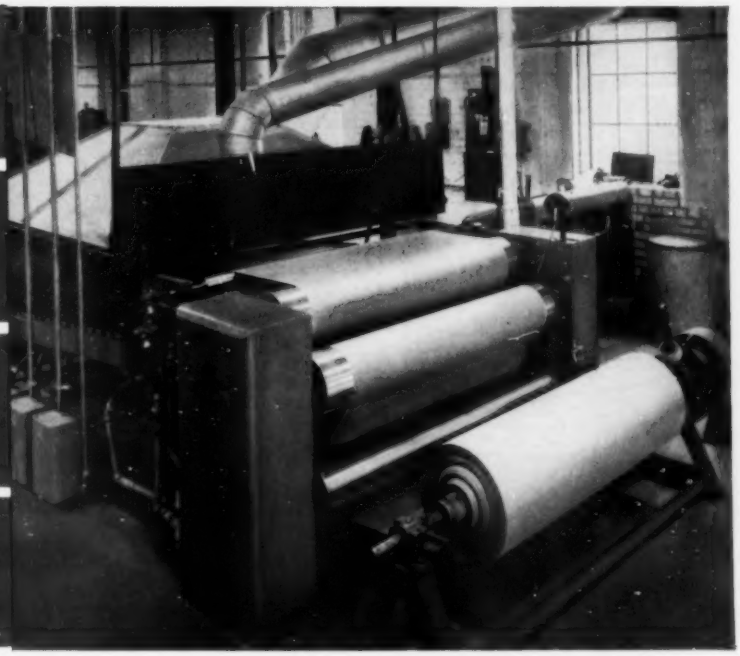
WEIGHING ONLY 44 lb., but capable of supporting loads up to 600 lb., transparent boat is vacuum formed in one piece by Sudbury Laboratory, Sudbury, Mass., of butyrate sheet. Molded-in keelsons provide support for bottom. Craft measures 8 ft. by 47 in., by 19 in. deep, sells for about $200. Three thousand such boats have been produced to date.

WALDRON ...now well into its second century in web processing engineering

YOUR REQUIREMENTS IN AN EMBOSSER?

IF THEY WOULD INCLUDE

- faithful and uniform reproduction of patterns, deep or shallow
- protection against undesirable stretch, width reduction, and web strain
- ability to handle different plastics constructions with equal facility
- ability to reproduce identical results from machine settings in successive runs



...if your requirements would include these—and others of equal importance—you will find them in today's design of the Waldron Plastics Embosser. Our work in connection with the processing of plastics webs began when plastics webs first came on the market. In fact, our business is designing machinery for processing webs of all materials: coaters, laminators, embossers, impregnators, printers. If you would like to know about this broad scope of our service, send for Catalog No. 10.

And, of course, if you are planning to install an embossing line, a Waldron Engineer will be glad to give you all the help he can.

M-R

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WEST COAST REPRESENTATIVE: BOJANOWER MACHINERY SERVICE CO.
5270 EAST WASHINGTON BOULEVARD, LOS ANGELES 22, CALIFORNIA

(From page 156)

They will withstand all atmospheric conditions and temperatures ranging from —67 to 185° F.

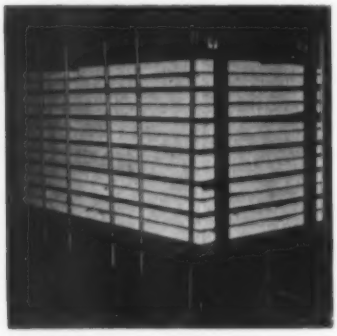
Four-ft. insulation saves 30% labor cost

Polystyrene foam, 3 in. thick and laminated between veneers of hardboard, proved the ideal material for the end panels of self-service refrigerated food displays produced by Sherer-Gillett Co., Marshall, Mich. The material provides close-fitting, high-efficiency insulation for improved cooling efficiency and resulting savings to the retailer. And, in addition, the insulation also provides structural strength.

Density of the foam, trade-named Uni-Crest, is 1.8 lb./cu. ft. It is produced in 4-ft. widths by United Cork Cos., Kearny, N. J., using polystyrene beads supplied by BASF.

The laminate is coated with polyester resin on the side facing into the case for better abrasion resistance. Sheet steel is bolted to the other side, with the same bolts attaching the panels to the case. Between the end panels and the case itself, a styrene cushion, ½ to ⅞ in. thick, prevents any condensation and leakage. A metal trim is applied to the end.

Reason for the choice of Uni-Crest for this application was the fact that it is supplied in 4-ft. widths. Earlier styrene foam insulation used came in only 1-ft. widths that had to be bonded together to obtain the desired dimensions. This fabrication step was unnecessary with Uni-Crest, resulting in a 30% labor saving.



FOAM BOARDS are laminated to hardboard faces in simple press.

Multi-purpose bath

Molded of high-density polyethylene, a new baby bath tub is light in weight (less than 3 lb.), extremely durable, and unaffected by oils and lotions. The use of high-density material makes the tub amply rigid for safe handling when filling and emptying.

Known as the Lifetime Tub, the new nursery accessory can serve other household purposes after baby outgrows it: for example, as a laundry basket, tote box, etc.

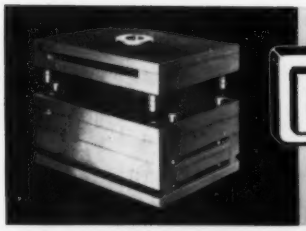
The tub is molded by Worcester Moulded Plastics Co., Worcester, Mass., for Baby Bathinette Corp., Rochester, N. Y., using Grex PE supplied by the Polymer Chemicals Div. of W. R. Grace & Co. It will fit all frames made by Baby Bathinette as well as many frames produced by other manufacturers, and is designed for either right- or left-hand use. It can also be used without a frame and retails, alone, for $5.95.

REFRIGERATED FOOD DISPLAY cabinet has ends fabricated of styrene foam panels that provide both insulation and structural strength.

"Bronze" letters really styrene

The luxurious look of hand-cut bronze signwork, at one-tenth the cost, is the claim made for new molded metallic styrene letters and numerals by the manufacturer, Laramie Chemical Corp., Stamford, Conn. Carrying a price tag of 30¢ per character, compared with a minimum of $3 each for bronze, the new metallic styrene characters are reported to require no maintenance because they cannot tarnish.

Injection molded in deep relief to give the timeless dignity of prismatic letters and numerals, these replicas have a pressure-sensitive adhesive backing that permits them to be instantly attached to plastic, **(To page 160)**



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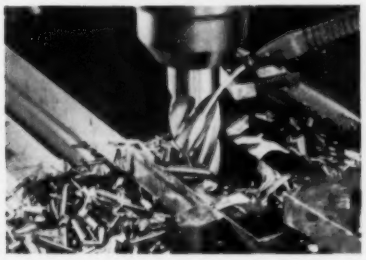
Start saving on your next moldmaking program, no matter how large or small. Take advantage of D-M-E Quality, Service and Economy.

IN LOCAL STOCK— Tools 'Tailor-Made' For Moldmakers



D-M-E's complete stock of moldmakers' tools and supplies can save you time and money! No more waiting for "special" oversize reamers to open up ejector pin holes; no more extra set-up charges. D-M-E has what you need—*in stock*.

In addition to fast-cutting End Mills, shown above, D-M-E also carries a complete stock of:

Ejector Pin COUNTERBORES

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Extra-long Socket Head SCREWS

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- D-M-E of CANADA, Inc., TORONTO, ONT.: 156 Norseman Ave.

59-A

metal, stone, glass, and wood surfaces.

The metallic effect is obtained by a post-molding operation in which the molded pieces are dipped into a bath and the resulting metallic coating is fused to the styrene surfaces. The molder states that the resulting finish "can be regarded as truly permanent."

Characters are available in sizes from ¾ to 2 in. high; companion alphabets are produced in black, white, and red, but only the metallic letters are recommended for outdoor use.

Seed-starter kit

Formed of two plastics materials —modified styrene and acetate sheet—a new package for garden seeds doubles as a planter in which seedlings sprout and are allowed to grow until they are ready for transplanting outdoors.

Known as "Punch 'N Grow," the seed starter kit consists of a styrene base which holds a special nutrient media and an acetate lid which is formed with a series of inverted cones to the apexes of which the seeds are fastened with a water-soluble adhesive. Parts are assembled with cones pressed down into nutrient.

When the seeds are to be started, the cones are punctured with a pencil and water is added. Within 24 hr. the acetate lid is removed and the styrene base serves as the planter box.

The plastics used are Campco sheet supplied by Campco Div., Chicago Molded Products Corp., Chicago, Ill.; they are formed by Mankato Paper Box Co., Mankato, Minn., for Northrup King, Minneapolis, Minn., distributors. The acetate sheet is 10 mils thick, the modified styrene is 15 mils.

The Campco materials were selected for the kit because the acetate has the desired optical clarity, will not crack or shatter during shipment yet allows the holes to be punched easily, and is inexpensive; the modified styrene has high impact resistance in thin sections, forms easily, makes an attractive appearance.

For the golf duffer

Two flexible disks molded of vinyl plastisol and mounted on an aluminum shaft can lighten the burden of the week-end golfer, even if they do not lower his score. The assembly replaces the conventional—and heavier—golf bag, yet holds up to eight clubs plus

three balls, tees, score card, and pencil. Unit retails for $5.95.

The disks, molded by Rexan Corp., Cleveland, Ohio, hold the clubs neatly in place. The lower disk has individual compartments in which the ends of the club shafts rest; the upper disk is molded with specially designed slots into which the club shanks are snapped. Holes in the upper disk hold the accessories.

(More on page 162)

NEW FROM HYDE—
12" X 36" NYLON SLAB STOCK!

Large Nylon Slab Now Available—Injection Molded by Hyde

Injection molded nylon slab stock and rod available in a wide range of sizes.

For complete service, A. L. Hyde will custommold to your requirements with injection presses ranging from 4 to 200 ounces.

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Profits go up when colors in your plastic products are bright, clean and uniform. For better-looking, faster-selling products, specify Glidden Zopaque titanium dioxide – the whitest white pigment obtainable – plus non-fading, non-bleeding Cadmolith and Mercadmolith colors.

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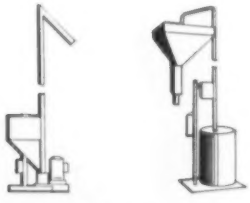
DRY AIR TO -20 DEWPOINT

with Whitlock Series 200 Dehumidifying Dryers. Hopper-Dryer utilizes an efficient closed-air system with a positive displacement blower. Uses a desiccant for air drying. Dried air is forced under pressure through plastic material in hopper. Features: automatic desiccant regeneration; quick access filter chamber; and, easy installation—no attachment to your equipment necessary. Capacities to 500 lbs. per hr.



Whitlock screw-type conveyors for dust-free loading.

Air conveyors use plant air—capacities to 2,500# per hr.

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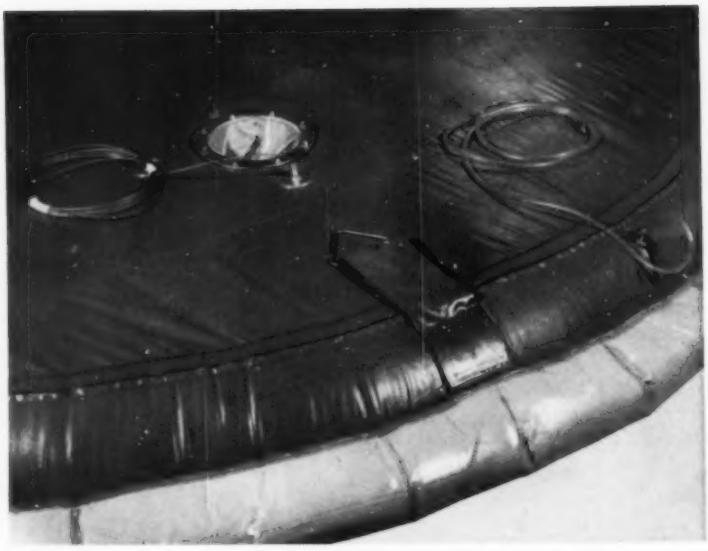


CLOSE-UP of tank seal. In foreground is segmented wiper ring, above which is the flotation ring. At right is the inflation tube, at right of center the lifting ring, and at left center the gaging well.

Nylon-on-nylon rafts conserve gasoline

Losses of gasoline by evaporation from bulk fuel service tanks can be reduced approximately 85% by the use of "rafts" which float on the surface of the stored liquid. Fabricated of nylon cloth coated with nylon resin, each raft consists of an inflatable ring, an overall circular membrane, and a series of wipers around the flotation ring which maintain a seal with the walls of the tank as the liquid level is raised or lowered.

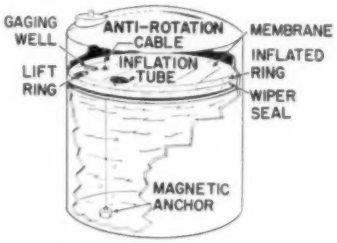
According to Esso Research & Engineering Co., where the idea of the raft originated, this method of evaporation reduction should make possible annual dollar savings of almost $200 per unit in tanks 10 ft. in diameter, approximately $500 in 15-ft. tanks, and up to more than $4000 in 40-ft. tanks, based on a gasoline value of 13¢ per gallon.

Known as the Mayflower Vapor Seal, the rafts are fabricated by Plastic Creators, Inc., Little Ferry, N. J., under a license from Esso. Total thickness of the nylon-on-nylon is 20 mils. Fabrication is by heat sealing, with special precautions taken to insure that all joints are airtight.

Sealed into the membrane of the raft is a valve through which can be dropped a weighted measuring tape and a thermometer. Adjacent to the valve is a guide hole for an anchor wire which prevents rotation of the raft. See drawing below.

Installation is simple, requiring only two men and less than 1 hr. for the smaller sizes; and four men and from 4 to 6 hr. for the largest. The raft, with the flotation ring uninflated, is simply stuffed into the manhole on top of the tank. When about ¾ of the raft has been inserted, the ring is partially inflated. The rest of the raft is then pushed through the manhole and inflation is completed.

Plant personnel also like the rafts because they eliminate release of vapors in the gager's face when measuring the depth and temperature of the tank's contents.—**End**



CROSS SECTION of fuel tank with vapor sealing nylon-on-nylon raft in place.

DOW Plastiatrics

DOW'S CLINICAL APPROACH TO HEALTHY PLASTICS APPLICATION

THREE DIMENSIONAL ANALYSIS IS VITAL TOOL IN PLASTICS MATERIAL SELECTION

In selecting a plastics material for optimum use in a given design application, the best results can be obtained only by comparative analysis of *all* available related data.

QUALITY CONTROL DATA are often taken at a single point of measurement (at times this may be the only available datum for a given property) and may appear to be valid basis for selection. This can be misleading. In the case of two hypothetical plastic materials under consideration, Figure 1 shows how both exhibit the same degree of deflection under identical loads at a given temperature. Thus both would appear to be equally suitable for the job at hand based on this cursory analysis.

SCREENING DATA, developed through further investigation, now show that plastics "A" and "B" have totally dissimilar curves and properties. Figure 2 illustrates the curves generated when temperatures are plotted against increasing stress at a uniform measure of deflection. The misleading single point in Fig. 1 now appears only as the crossing point of the two dimensional curves. The difference in deflection temperature between the two samples is unmistakable.

DESIGN AND ENGINEERING DATA require further analysis. A three dimensional curve of deflection temperature, stress and allowable deflection is now plotted for each of the plastics. Figure 3 illustrates such a diagram for plastic material "A". Only in this way can we get a full picture of the material's potential value under possible changing conditions of use.

A great deal of experimental work is required to accumulate data sufficient to develop such three dimensional curves, but their ultimate application in design work makes them invaluable. Because of their inherent value to design engineers, Dow Plastics Technical Service Engineers are conducting extensive research in the gathering of multi-dimensional data on a number of Dow molding material formulations. This work is part of a continuing series of Plastiatrics studies aimed at assisting designers and engineers in the most effective selection of plastics materials.

For more information on this important work, and on data presently available, write Plastics Sales Dept. 2103CS6, THE DOW CHEMICAL COMPANY, Midland, Michigan.

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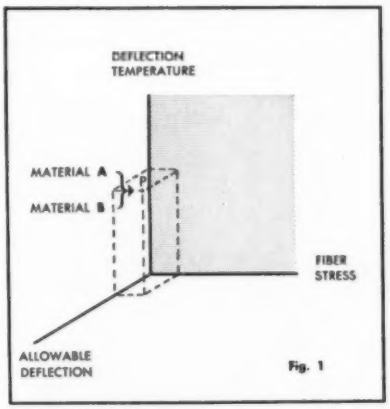

Fig. 1

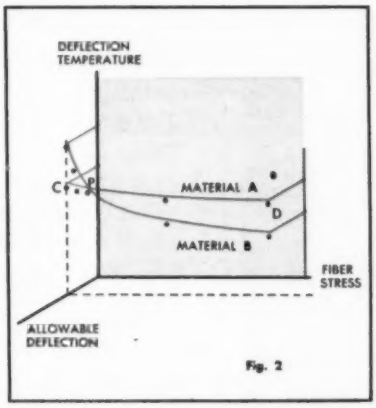

Fig. 2

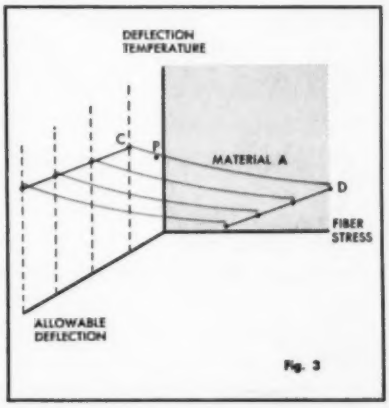

Fig. 3

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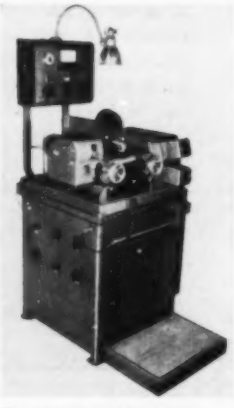

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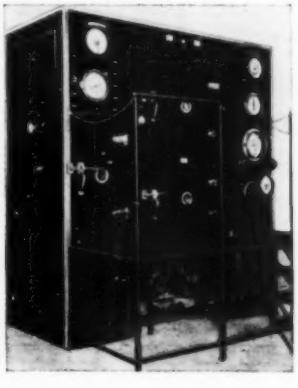

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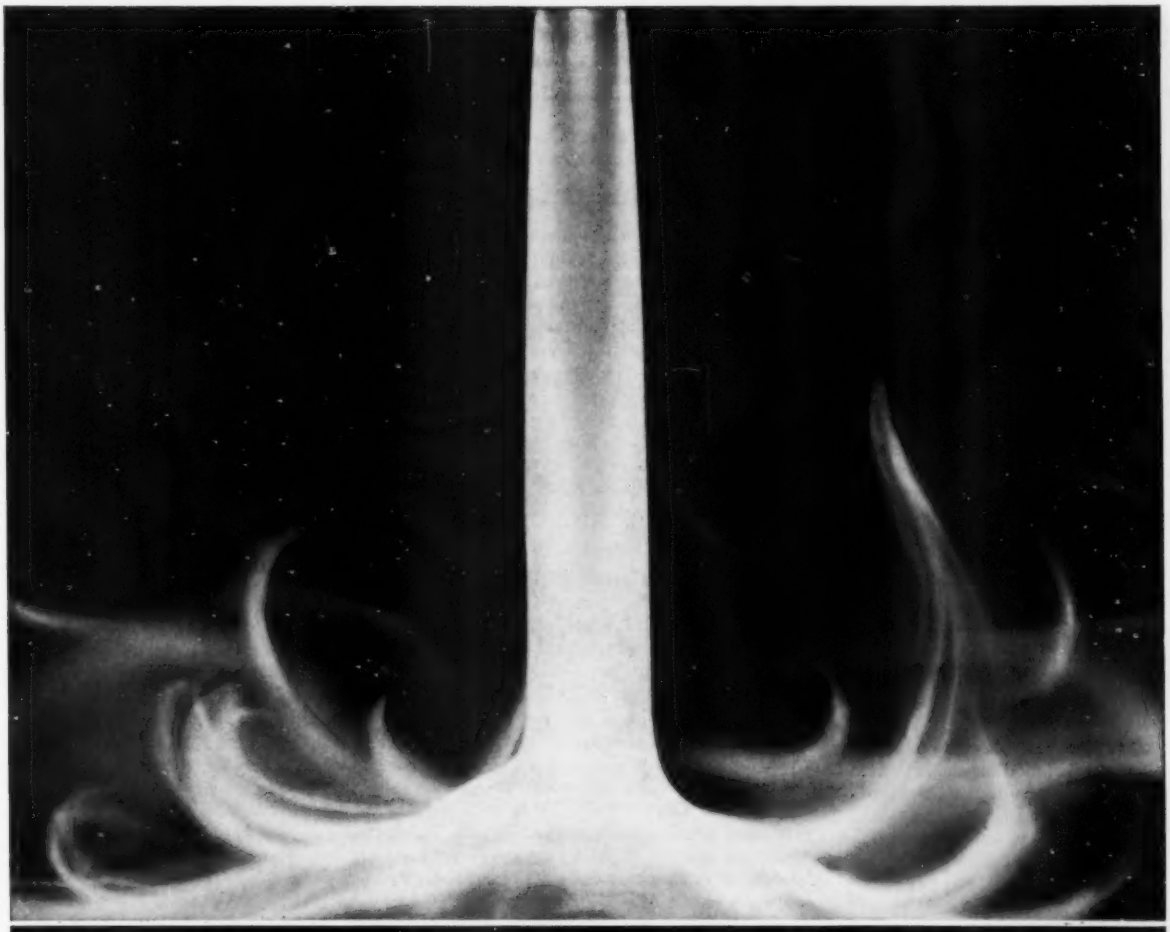

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Antimony Trioxide	(parts by weight)	—	12.5
Luperco ATC	(parts by weight)	2.0	2.0
3 oz. Glass Mat	(parts by weight)	60.0	60.0
Flexural strength psi (dry)		26,400	27,500
Flexural strength psi (wet)		24,000	25,000
Tensile strength psi (dry)		15,000	15,700
Tensile strength psi (wet)		14,000	14,300
Flame-out (seconds)		Burns	1
POLYETHYLENE SYSTEM*			
Polyethylene Resin	(parts by weight)	100.0	85.0 — 63.0
Chlorowax 70	(parts by weight)	—	7.5 — 18.5
Antimony Trioxide	(parts by weight)	—	7.5 — 18.5
Antioxidant	(parts by weight)	.5	.5
Tensile strength (psi)		1,800	1,650—1,500
% elongation		600	590— 200
Flammability		Burns	Self-extinguishing

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LITERATURE

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery.

"British Plastics Year Book, 1959."

Published in 1959 by Iliffe & Sons, Ltd., Dorset House, Stamford St., London, S.E. 1, England. 644 pages. Price: 42s. net ($5.92).

This 29th edition has been revised and divided into nine sections. Three are devoted to classified lists of manufacturers and suppliers of materials, finished products, and equipment, while a fourth section contains a list of world-wide trade and proprietary names connected with the industry, covering materials as well as finished goods. The names and addresses section contains nearly 4500 firms associated with plastics, and is divided into a section for United Kingdom companies and one for overseas firms. The Who's Who section is devoted only to U. K. personnel.

The set of tables giving comparative properties of plastics materials, which was included for the first time in the previous issue, has been revised. Also included is revised glossary of technical terms, list of companies registered during 1958, and specifications relating to plastics.

"Encyclopédie Française des Matières Plastiques."

Published in 1959 by Industrie des Plastiques Modernes, 40 Rue du Colisée, Paris 8°, France. 578 pages. Price: 5950 frs. ($14.31) (In French).

Four years have elapsed since this encyclopedia was last published. It has now been revised to cover latest plastics developments in applications, materials, and processing techniques. A classified and alphabetical index of French plastics companies is included.

"Digest of world literature on adhesive bonding," by Prof. Dr.-Ing.habil Karl Krekeler et al. (In German).

Published in 1958 as "Forschungsbericht Nr. 639 des Wirtschafts- und Verkehrsministeriums Nordrhein-Westfalen" by Westdeutscher Verlag, Opladen, Ophovenerstrasse 1-3, Western Germany. 152 pages. Price: DM 37.80 (approx. $9.00).

This very comprehensive digest is primarily concerned with adhesive bonding of metals, but its wide range of source material and detailed abstracts covering properties, applications and processes, makes this publication a useful reference work on adhesives in general, and on the structural uses of adhesives in particular. The abstracts are arranged in chronological order, beginning in 1938 and including material published in 1956. This volume will be kept up-to-date by annual summaries of subsequent literature on adhesive bonding. The 429 abstracts from the world's trade press, technical papers, and company literature are concise but in sufficient detail. Complete cross references by application, tradenames, authors, and general subject matter, have also been provided.

Urethane foaming resin. "Thiokol's Rigithane 112 Urethane Foaming Resin for Use in Preparing Semi-Rigid and Rigid Foams." 2 pages. "Mold Release Agents for Use with Rigithane 112." 3 pages. "Catalysts for Use with Rigithane 112." 6 pages. *Thiokol Chemical Corp., Trenton 7, N. J.*

Nylon stock shapes. Physical property data, specific stock shapes, applications, etc., for Nylatron GS molybdenum disulphide-filled nylon shapes. 4 pages. *The Polymer Corp. of Pa., Reading, Pa.*

Strain gages. "How to Select a Strain Gage" compares the characteristics of resistance strain gages made by eight different United States manufacturers. 24 pages. *Stein Engineering Services, 5602 E. Monte Rosa, Phoenix, Ariz.*

Electric heaters. Features, applications, engineering data, etc., for a line of Chromalox flexible and molded electric heaters for the plastics and other industries. Voltages range from 2 to 250 v.; from fractional up to 15 w./sq. in. Bulletin J-1003. 4 pages. *Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, Pa.*

Adjustable speed drive. Dimensions, features, engineering data, etc., on Ajusto-Spede drives in ratings of ¾ to 7½ hp. Bulletin 2750. 6 pages. *The Louis Allis Co., 427 E. Stewart St., Milwaukee 1, Wis.*

High-melting wax. Specifications, properties, characteristics, uses, etc., for PE Tetrastearate, a hard, high-melting wax used as a moisture-vapor penetration control ingredient in coatings for plastics films and paper and other applications. 1 page. *Synthetics Dept., Hercules Powder Co., Wilmington, Del.*

Shell molding. Selected list of over 200 annotated references to books, reports, and articles published from 1952 to 1958, covering all aspects of shell molding, including theory, principles, production practice in large and small foundries, materials, design, testing methods, equipment, and costs. 28 pages. ESL Bibliography No. 13. Price: $2.00. *Engineering Societies Library, 29 W. 39th St., New York 18, N. Y.*

Teflon-coated glass fabric. Electrical, chemical, and physical properties, applications, etc., for five types of Fluorglas Teflon-coated glass fabric for electrical insulation, no stick coatings, and heat sealing; Fluorglas adhesive tapes, yarn, sewing thread, lacing tape, and woven fabric. 4 pages. *Commercial Plastics & Supply Corp., 630 Broadway, New York 12, N. Y.*

Electronic thermometer. Specifications, ranges, uses, etc., for Thermophil thermistor thermometers capable of temperature measurements between —328 and 845° F., and with accuracy said to be ±0.25° F. on short span instruments between —60 and 120° F. Applications include plastic and rubber masses, air and gases, etc. 6 pages. Bulletin B. *Atkins Technical, Inc., 1276 W. 3rd St., Cleveland 13, Ohio.*

Dimer acid. "Abstracts of Dimer Acid Use-Patents and Journal References" contains abstracts of 113 U. S. patents and 27 published articles dealing with the use and application of the acid. Fields of use covered by patents and articles include polymers, surface coatings, urethane foams, and similar applications. Technical Bulletin 412. *Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio.*

Polysulfide epoxy resin compounds. Provides general information on the increased flexibility, impact, and chemical resistance which are obtainable with this system for protective coatings and adhesives, as well as electrical potting, **(To page 168)**

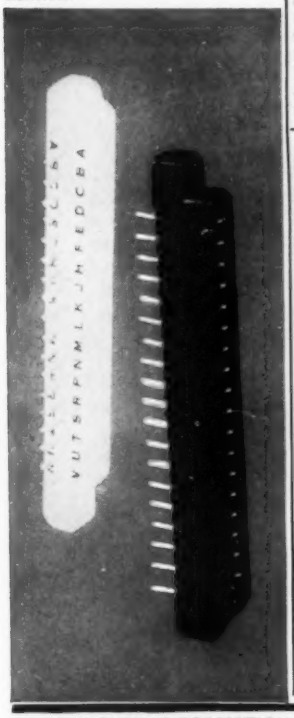
Plaskon Nylon News

Type 6 • Nylon's Range of Applications Expands!

MORE AND MORE INDUSTRIAL AND CONSUMER PRODUCTS MAKE USE OF ITS OUTSTANDING PROPERTIES

Durable Electrical Circuits

Space Products, Long Beach, Calif., uses flexible Plaskon Nylon 8200 for circuit connectors because it produces higher uniformity of finished parts yet lowers manufacturing costs. These "Ezi-Connectors" feature beryllium contacts, with a fatigue resistance twice as great as that of spring brass or phosphor bronze. They are moisture-proof and can be easily and repeatedly inserted and removed. Available in several colors, they are lettered to permit easy assembly and identification.



Reliable Missile Fire Connector

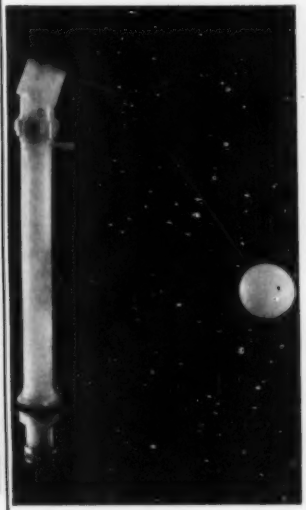
Plaskon Nylon 8200's outstanding durability, light weight and resilience are put to good use in this missile fire connector. Injection molded nylon provides excellent insulation and seal against contaminants and moisture for the connector's contacts, as well as mechanical protection for the unit itself. The manufacturer, Alden Products, Brockton, Mass., reports that Plaskon Nylon 8200 enables him to achieve the highest compactness and reliability for this vitally important missile component.

High Strength Closures

This smooth, lustrous Plaskon Nylon cap nut will not scratch, snap or tear other surfaces as do metal caps. Ideal for use in the furniture and electronics industries, the "Relok" Nut is rust-proof, antimagnetic and self-locking. Plaskon Nylon's high strength and impact resistance enable it to withstand rugged duty. The Lehigh Metal Products Company, Cambridge, Mass., supplies the "Relok" Nut in several lengths and colors.

Superior Ballcock Valve

The Hydo Valve Corporation, Austin, Texas, manufactures this ballcock toilet valve with injection molded Plaskon Nylon 8200. The valve's superior action cuts water closet fill time in half and eliminates noise and seepage. Plaskon Nylon is ideal for products of this type because of its high resistance to heat, chemicals and abrasion. Also, nylon's light weight produces a more compact unit, which can be more economically stored and shipped.



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Allied Chemical

LITERATURE

(*From page 166*)

casting, and plastic tooling applications. 16 pages. *Thiokol Chemical Corp., Trenton 7, N. J.*

Rigid extrusions. General properties, uses, sizes, etc., for the range of Rockite rigid extrusions, which are made from Rockite phenolic molding materials. Technical Booklet T.1. 14 pages. *British Resin Products, Ltd., Devonshire House, Piccadilly, London W1, England.*

Pigments. "Luminescent Pigment Color Selector" describes use of fluorescent and phosphorescent pigments in plastics, rubber, paper, and other applications. 4 pages. *U. S. Radium Corp., Morristown, N. J.*

Conveying systems. Describes major components of the Sprout-Waldron Pneu-Flo positive pressure pneumatic conveying systems for use in plastics and chemical plants, etc. Bulletin 208. *Sprout-Waldron & Co., Inc., 130 Logan St., Muncy, Pa.*

Thermoplastics. Characteristics, uses, selector guide, properties chart, etc., for the six materials—Acrylux, Fluorolux, Styrolux, Hi-Styrolux, Ethylux, and Ultra-Ethylux—that comprise the Alphalux Thermoplastics shapes manufactured by this firm. Form W-200. 6 pages. *Westlake Plastics Co., Lenni Mills, Pa.*

Polyester resins. "IC Polyesters Hand Lay-Up Applications" describes special polyester resins and accessory items for manufacture of boats, swimming pools, for surfacing with or without fibrous glass, and for a variety of applications where hand lay-up process is used. 5 pages. *Finishes Div., Interchemical Corp., 1754 Dana Ave., Cincinnati 7, Ohio.*

Marking, numbering machines. Describes a line of marking and numbering machines, including supplemental items, such as; stamps, dies, engraving, nameplates, tablets, signs, foils, inks, etc. for the plastics and other industries. 14 pages. *The Acromark Co., 9-13 Morrell St., Elizabeth 4, N. J.*

Fibrous glass panels. "How to Build for Better Living with Filon Guaranteed Fiberglass Panels" shows how to build patio enclosures, awnings, carports, garage doors, room dividers, tub and shower enclosures, greenhouses, fences, pool enclosures, etc. Includes heat and light transmission charts, available colors and configurations, stock widths, lengths, and accessories. Form 151. 8 pages. *Filon Plastics Corp., 125 Lomita St., El Segundo, Calif.*

Plastic pipe clamps. Describes a line of All-Stainless and Gold Seal clamps—collared screw and non-collared screw—designed for plastics pipe and other applications. Catalog C-1-59. 4 pages. *Murray Co., Towson 4, Md.*

Presses. Specifications, uses, etc., for a line of electric, air, and hand-operated hydraulic presses; arbor presses; utility presses; and custom engineered presses for plastics molding and fabricating. Catalog 350-A. 16 pages. *Dake Corp., Grand Haven, Mich.*

Molding machines. Describes line of machinery for molding plastics, including injection machines—both conventional and preplasticating—compression, transfer, and reinforced plastics molding presses; and special machines. Bulletin 5830-A. 6 pages. *The Hydraulic Press Mfg. Co., Mount Gilead, Ohio.*

Constant - temperature humidity equipment. Specifications, features, uses, etc., for a line of temperature-humidity equipment, constant-temperature cabinets, baths, etc., for the plastics and other industries. 48 pages. Catalog 500. *American Instrument Co., Inc., 8030 Georgia Ave., Silver Spring, Md.*

Corrosion resistance. "Welded Polyethylene Duct Systems Resist Corrosion, Cut Costs For Exhausting Alkali and Acid Fumes" describes how the use of exhaust systems made from thermoplastics can combat corrosion. 4 pages. *American Agile Corp., Box 168, Bedford, Ohio.*

Adhesives data chart. Wall chart covers broad line of industrial adhesives, including water base resin, solvent and solvent-base resin, hot-melt and epoxy, their characteristics, uses, methods of application, etc. 1 page. *Flexcraft Industries, 527 Avenue P, Newark 5, N. J.*

Laminated architectural glass. Describes how such glass is manufactured, how special decorative effects are achieved, and how the plastic interlayer is tailored for light control, glare reduction, ultraviolet exclusion, and solar energy control. 8 pages. *Plastics Div., Monsanto Chemical Co., Springfield 2, Mass.*

Solid plasticizers. "How You Can Benefit from Monsanto Solid Plasticizers" describes their versatility in adhesives, lacquers, foams, films, and rigid plastic compositions. 8 pages. *Monsanto Chemical Co., St. Louis 24, Mo.*

Temperature control system. Describes Power-O-Matic control system, which automatically proportions minimum wattage to operating temperature and work load. Bulletin 1950. 4 pages. *Blue M Electric Co., 138th and Chatham Sts., Blue Island, Ill.*

Hydraulic operating valves. Sizes, specifications, uses, etc., for a line of single piston-type hydraulic operating valves. Available in sizes from ½ in. to 2 in.; working pressures up to 2000 pounds. Reference Book 39-6. 20 pages. *Homestead Valve Mfg. Co., Coraopolis, Pa.*

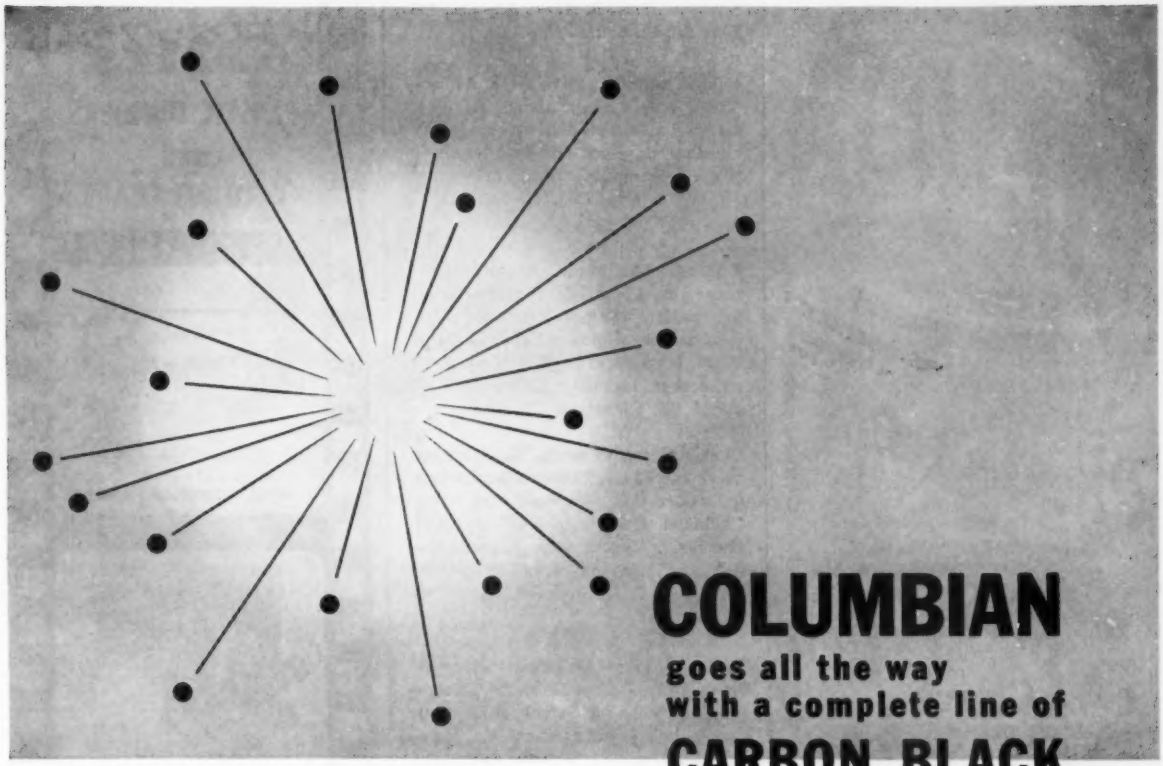
Printed circuits. "Reliability and Cost in Printed Circuits" discusses the relationship between various factors affecting both cost and reliability and points out that proper printed circuit design may reduce cost and increase reliability. 18 pages. *Arthur Ansley Mfg. Co., New Hope, Pa.*

Adhesives. "54 Answers to Your Adhesive Problems." "Adhesives Raw Materials Engineered for Your End-Use" (Two parts). "Get the 'Full Service' Treatment." A series of 4-page folders on adhesive applications. *Shawinigan Resins Corp., Springfield 2, Mass.*

Repair cement. Describes how to use Metalset A-4 epoxy resin-aluminum cement, supplied in self-metering tubes, for filling seams, caulking, bonding, repairing pattern defects, etc. 4 pages. *Smooth-On Mfg. Co., 572 Communipaw Ave., Jersey City 4, N. J.*

Vibrating screens. Dimensions, applications, specifications, etc., for a line of vibrating screening-feeders, designed for simultaneous screening and feeding of bulk materials ranging in size from 325 mesh to 2 inches. 2 pages. *Syntron Co., Box 220, Homer City, Pa.*

Explosives bags. "13 Questions and Answers" describes an explosives bag, which is constructed of kraft paper tubed around extruded pinhole-free polyethylene. **(To page 170)**



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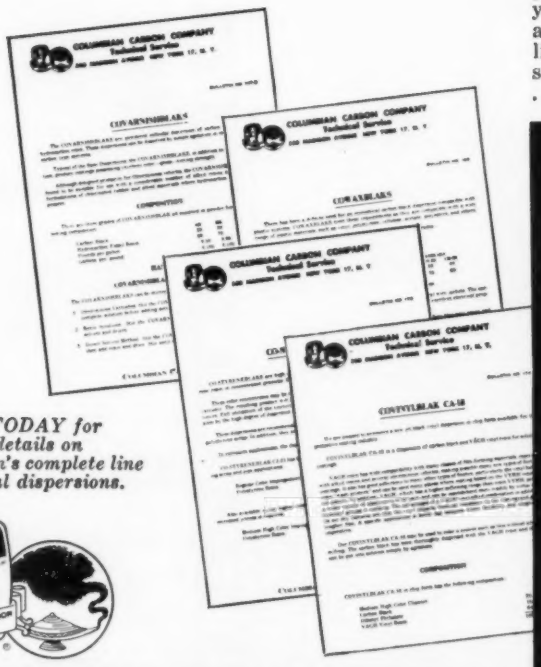

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8 pages. *Bemis Brothers Bag Co., 408 Pine St., St. Louis 2, Mo.*

Coated tubings. Physical and electrical data, applications, features, etc., for a line of coated tubings, including vinyl-coated glass cloth. 6 pages. *Irvington Div., Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul 6, Minn.*

Cutting machines. Specifications, uses, etc., for a line of high-speed, automatic cutting machines for plastics, rubber, textiles, etc. Bulletin W100. 8 pages. *The Motch & Merryweather Machinery Co., 1250 E. 222nd St., Cleveland 17, Ohio.*

Plastic piping systems. "Engineering of Plastic Piping Systems Equipment for Corrosion Service, Including Chemical Resistance and Physical Properties Charts with Recommendations." Catalog 159. 16 pages. *Chemtrol, 10872 Stanford, Lynwood, Calif.*

Knife cutters. Describes line of heavy-duty knife cutters for granulating thermoplastic stock, chalk, and charcoal; hogging rubber; etc. Bulletin 213 (supersedes 101 and 141). 4 pages. *Sprout, Waldron & Co., Inc., 130 Logan St., Muncy, Pa.*

Metering, mixing machines. Specifications for 10 machines for metering and mixing urethane prepolymers for foaming in place. Capacities range from ½ lb. and 80 lb./min. 4 pages. *Plastics Sales Div., Dayton Rubber Co., Dayton 1, Ohio.*

Vinyls. Properties, uses, and other technical data on Butvar, polyvinyl butyral, and Formvar, polyvinyl formal. 32 pages. *Shawinigan Resins Corp., Springfield 1, Mass.*

Extruded and coated tubings. Specifications and customer service information for a line of extruded and coated tubings, including vinyl. Manual 59T. 24 pages. *William Brand & Co., Inc., Willimantic, Conn.*

Urethane elastomer potting compounds. Formulations, precautions, and other technical data for Multrathane raw materials, which are used to prepare urethane elastomers for potting and encapsulating applications. 10 pages. *Mobay Chemical Co., Pittsburgh 34, Pa.*

Styrene copolymer. General information, physical constants, solution properties, pH effect, viscosities, compatibility, plasticization, and other technical data **(To page 172)**

Dilts

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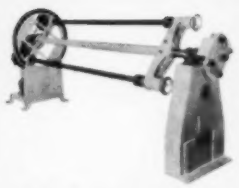

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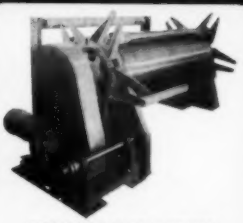

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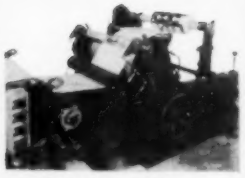

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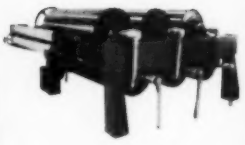

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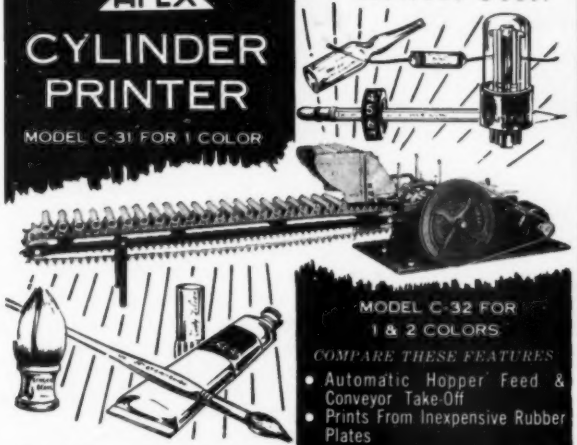

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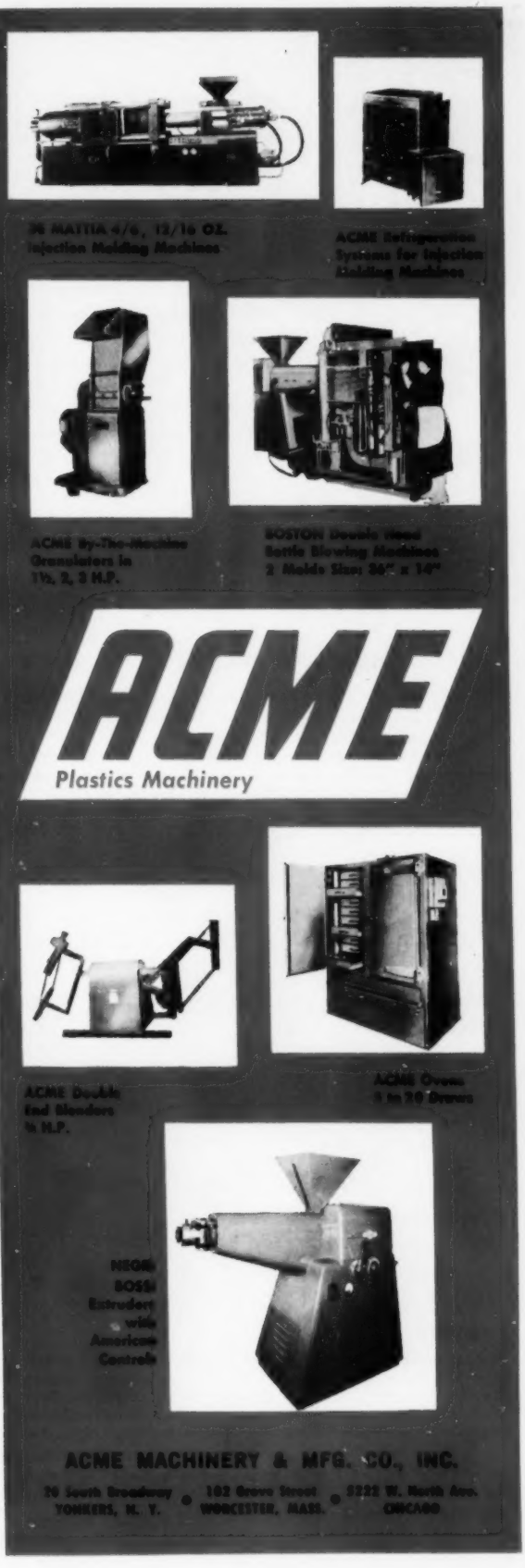
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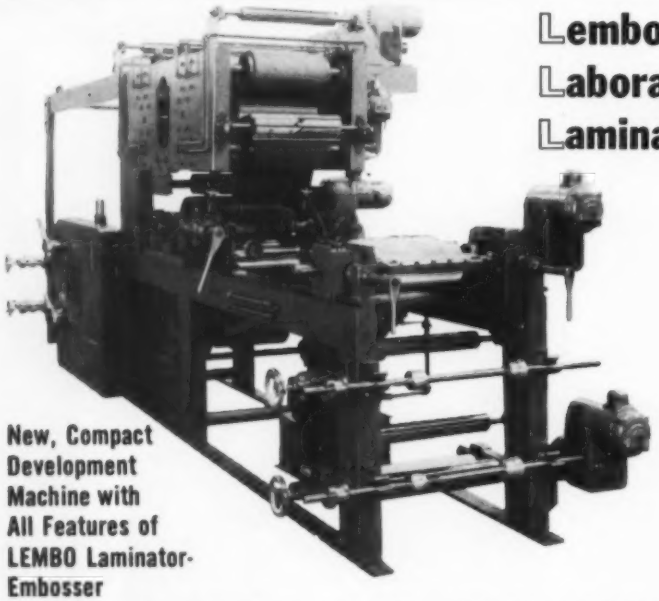

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on Lytron 822, a polyelectrolyte resin, free-flowing, powdered carboxyl containing styrene copolymer. Technical Service Bulletin 2646. 8 pages. *Plastics Div., Monsanto Chemical Co., Springfield 2, Mass.*

Couplings. Construction, sizes, uses, etc., for seven styles of Teflon-, rubber-, and neoprene-lined expansion joints and flexible couplings. 12 pages. *The Garlock Packing Co., Palmyra, N. Y.*

Plexiglas sheets. Prices, quantity discounts, available grades, colors, patterns, thickness tolerances, etc., for a line of Plexiglas cast acrylic sheets and Cadco extruded acrylic sheets. 16 pages. *Cadillac Plastic & Chemical Co., 15111 Second Blvd., Detroit 3, Mich.*

Remote digital weights and controls. Description, uses, advantages, etc., for a line of remote digital weights and controls for the plastics and other industries. Form 2975a. 8 pages. *Toledo Scale Div. of Toledo Scale Corp., Toledo, Ohio.*

Fibrous glass panels. Specifications, uses, etc., for a line of residential and industrial translucent fibrous glass panels. 4 pages. *Alsynite Co. of America, 4654 De Soto St., San Diego 9, Calif.*

Color concentrates for epoxy resins. Colors, uses, list of suppliers, prices, samples, etc., for a line of paste color concentrates for epoxy resins. 6 pages. *Ferro Corp., Plastic Color Section, 4150 E. 56th St., Cleveland 5, Ohio.*

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Release papers. Technical data, samples, etc., for a line of Ripco release papers for plastics. 4 pages. *Rhinelander Paper Co., Rhinelander, Wis.*

Salicylaldehyde. Properties, specifications, reactions, uses, toxicological information, and reaction references, for salicylaldehyde, a chemical intermediate for coating resins and other **(To page 174)**

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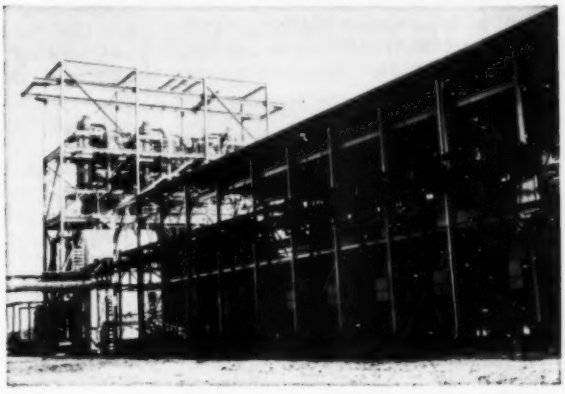

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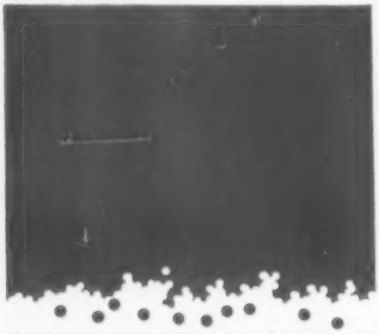

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Teflon. Shapes, sizes, properties, uses, etc., for Cadco Teflon sheets, tape, rods, tubing, bars, and cylinders. Catalog TFE-359. 8 pages. *Cadillac Plastic and Chemical Co., 15111 Second Blvd., Detroit 3, Mich.*

PVC valves. Sizes, weights, dimensions, uses, etc., for a line of Luncor PVC valves. Brochure 601. 6 pages. *Lunkenheimer Co., Cincinnati 14, Ohio.*

Formulas and tables for polyethylene film and bags. Very valuable tables, graphs, and drawings, including list of resins suggested for bags and other film applications, give area yield per pound, weight per length and width, weight per roll, weight per bag, and other useful data. 8 pages. *U. S. Industrial Chemicals Co., 99 Park Ave., New York 16, N. Y.*

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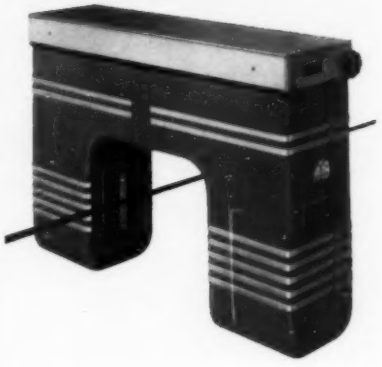

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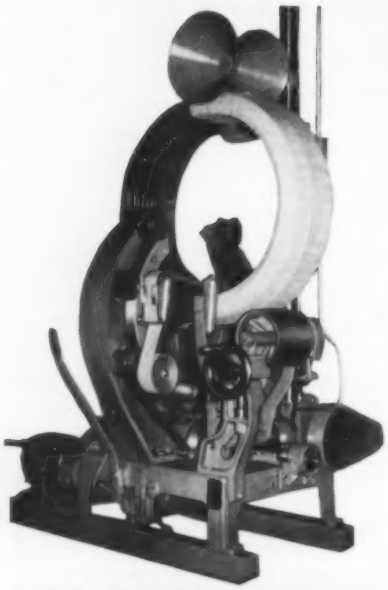

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Tolylene diisocyanate. Properties, hazards, employee safety, fire fighting, handling and storage, first aid, etc., for tolylene diisocyanate, used in the preparation of urethanes. Chemical Safety Data Sheet SD-73. 16 pages. Price: 30 cents. *Manufacturing Chemists' Assn., Inc., 1825 Connecticut Ave., Washington 9, D. C.*

Manual on Food Additives Amendment of 1958. "Primer" prepared by S.P.I. Food Packaging Materials Committee and designed to advise all interested persons of the basic requirements of the Federal Food Additives Amendment of 1958. 28 pages. *The Society of the Plastics Industry, Inc., 250 Park Ave., New York 17, N. Y.*

Plastics bottles. "The Plastic Bottle Comes of Age" describes the advantages and uses of plastics bottles, and outlines the profit and volume potential for the user. 10 pages. *Hercules Powder Co., Wilmington 99, Del.*

Solenoid valves. Specifications, prices, uses, etc. for a line of electrically-operated solenoid valves for air, gas, liquids, and steam. Catalog 444. 36 pages. *Atkomatic Valve Co., Inc., 545 W. Abbott St., Indianapolis 25, Ind.*

Silicone intermediates. Copolymer reaction, physical properties, uses, handling characteristics, and other technical data for a line of silicone intermediates for modifying organic resins. 12 pages. *Silicones Div., Union Carbide Corp., 30 E. 42nd St., New York 17, N. Y.*

Production facilities. A 25th anniversary report on the facilities and growth of a firm which specializes in the production of wire, cable, and plastics products for missile, aircraft, electronics, and communication industries. 10 pages. *Rex Corp., West Acton, Mass.*

Portable thermoplastic spray unit. Operation, powder level, fluidization control, metal preheating, spray technique, uses, etc., for the Mark III portable thermoplastic spray unit for spray coating of corrosion-resistant plastics over affected areas. 2 pages. *American Agile Corp., Box 168, Bedford, Ohio.*

Checkweighers. Components, principle of operation, specifications, uses, detector devices, etc., for a line of checkweighing scales. 4 pages. *Thayer Scale Corp., 1 Thayer Park, Pembroke, Mass.*

Design facilities. Brochure describes service, installation, design, and manufacturing facilities available to the plastics industry. 4 pages. *Hydraulic Service Co., 520 Cottman St., Cheltenham, Pa.*

Eight Potentials for Plastics in Georgia. Outlines opportunities which exist for the manufacture of plastics in Georgia. 50 pages. *Georgia Department of Commerce, Atlanta, Ga.*

Packaging with Plastics. Report includes: "The Dimensions of Progress;" "New Materials for New Packages;" "Equipment Trends and Developments;" and "Modern Methods and Applications." 132 pages. AMA Management Report No. 29. Price: $3.75; AMA members, $2.50. *Packaging Div., American Management Assn., Inc., 1515 Broadway, Times Square, New York 36, N. Y.*

Styrene-methyl methacrylate copolymer. Physical properties, fabrication data, granulation and lubrication information, etc., for Zerlon 150, a styrene-methyl methacrylate copolymer. 4 pages. *The Dow Chemical Co., Midland, Mich.*

Dyeing post-molded plastics. "How to Color Code Plastic Parts at Low Cost" describes the facilities available, types of plastics colored, etc. 6 pages. *Colorite Industrial Dyers, 244 W. 38th St., New York 18, N. Y.*

Polystyrenes. Definitions, applications, types, properties, design considerations, fabricating techniques, finishing operations, etc., for a line of Dylene polystyrenes. Technical Bulletin C-9-231. 24 pages. *Plastics Div., Koppers Co., Inc., Pittsburgh 19, Pa.*

Comparison of maintenance coating systems. Wall chart designed to aid engineers and others concerned with buying and specifying corrosion-resistant maintenance protective coatings. 4 pages. Chart No. 5. *Carboline Co., 32 Hanley Industrial Court, Brentwood 17, Mo.*

Lubricant selection. Lubricant selector chart facilitates choice of the proper lubricant for any extreme pressure lubrication job, including temperature, environment, method of application, etc. Bulletin 121. 4 pages. *Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn.*—**End**

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Plastics Patents

(*From page 52*)

Linear polyesters. D. S. Young, R. M. Schulken, Jr., and L. D. Moore, Jr. (to Eastman Kodak). 2,875,176.

Polyhydric phenol resins. F. P. Greenspan and R. E. Light, Jr. (to Food Machinery). 2,875,178.

Curing phenolic resins. J. H. Freeman (to Westinghouse). 2,875,179.

Hydroxymethylfurfural-ketone resins. F. H. Snyder (to Dendrol). 2,875,180.

Polyesters. G. Faerber (to Deutsche Solvay). 2,875,181.

Polysulfide polymers. E. M. Fettes and E. R. Bertozzi (to Thiokol). 2,875,182.

Chlorinated aromatic disulfonyl halide, diamine condensates. W. A. Murphy (to Du Pont). 2,875,183.

Polymerizing vinylidene compounds. R. M. Wiley (to Dow). 2,875,185.

Polymerizing vinyl chloride. J. R. Gerhard, II, C. C. Deegan, and T. W. Fisher, Jr. (to Firestone). 2,875,186-7.

U. S. Pats., Mar. 3, 1959

Emulsion polymerization with polybasic acid soap. V. A. Miller and R. O. Becker (to International Latex). 2,876,203.

Wax-polyethylene - polyisobutylene composition. H. G. Schneider, D. W. Young, and J. P. Rocca (to Esso). 2,876,204.

Fluorochlorocarbon polymer dispersion. I. Green (to Minnesota Mining). 2,876,206.

Metal chelates in phenolic resins. M. Naps (to Shell). 2,876,208.

Alkoxyalkyl alpha-alkyl acrylate, aldehyde, heavy metal salt composition. M. E. Cupery (to Du Pont). 2,876,211-2.

Curing epoxidized diene polymers with hydrazine and carbon disulfide. C. E. Wheelock and B. Franzus (to Phillips). 2,876,214.

Dialkylidene 5-membered heterocyclic polymers. J. L. Anderson and H. E. Winberg (to Du Pont). 2,876,216.

Polymeric polyfluoroalkyl phosphonitrilates. R. F. W. Ratz and C. J. Grundmann (to Olin Mathieson). 2,876,247-8.

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Polyurethane containing a metallic dicyanamide. J. Burkus (to U. S. Rubber). 2,877,192.—**End**

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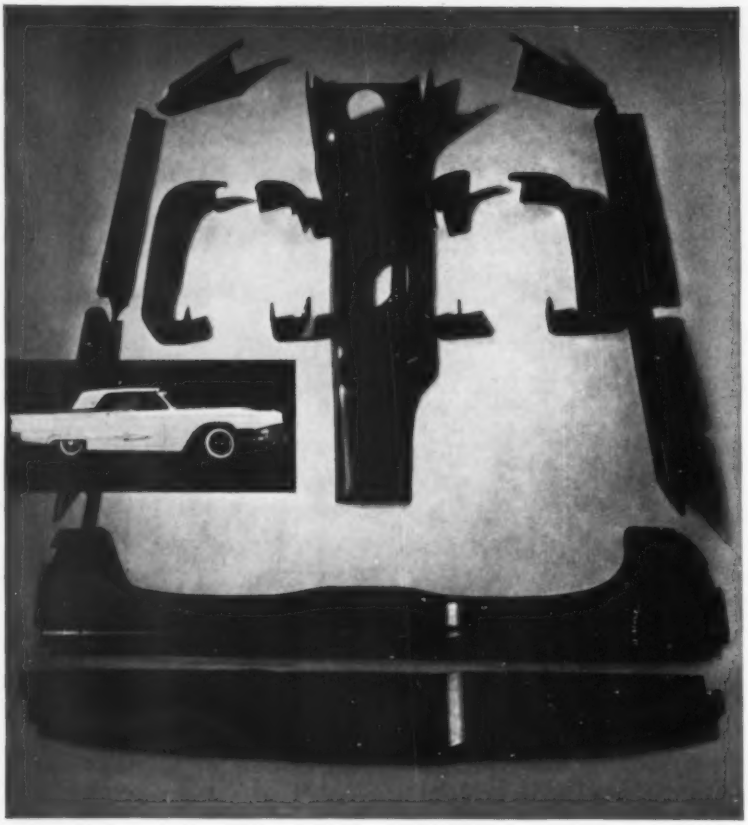

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Plastics Digest

(From page 56)

did the controls, indicating no toxic effects of plastics towards the microorganisms. Results indicated the materials tested would be suitable for packaging use. Included in the study were 23 plastics consisting of the following types: polyethylene, polyvinyl chloride, acrylics, nylon, polytrifluorochloroethylene, polytetrafluoroethylene, polystyrene, ethyl cellulose, cellulose acetate butyrate.

Modified Vicat type apparatus for measuring the softening point of thermosetting plastics and laminates. G. F. L. Ehlers. ASTM Bulletin No. 236, 54-56 (Feb. 1959). The Vicat softening point test (penetration type) is modified by enclosing the specimen in a sample holder, which provides a more uniform heat source. Results of tests with thermosetting and laminated plastics are presented and correlated with deflection temperature (ASTM D 648).

Adhering Dacron to rubber. L. W. Parke. Adhesives Age *2*, 27-30 (Mar. 1959). Tests for evaluating adhesives for bonding Dacron to rubber.

Nitrogen determination in high polymers. W. Skoda and J. Schurz. Z. Anal. Chem. *162*, 259-63 (1958). The nitrogen content of polyacrylonitrile, poly(vinyl pyrrolidone) and poly(vinyl carbazole) may be determined with the Kjeldahl method, by digesting 0.3 to 0.4 g. of the sample with 40 ml. concentrated sulfuric acid, 1 g. copper sulfate, 0.7 g. mercuric oxide, 0.5 to 0.7 g. mercury, and 9 g. sodium sulfate for 1 hour. The normal procedures for digestions is used for materials containing mercury.

Photometric determination of aluminum and titanium in polyethylene. W. T. Bolleter. Analytical Chem. *31*, 201-03 (Feb. 1959). Wet- and dry-ashing procedures are used for the decomposition of polyethylene with the attendant dissolution of the metals in the polymer. Aluminum is determined photometrically after extraction of the aluminum 8-quinolinolate into trichloroethylene from an ammoniacal solution. The absorbance of the complex is measured at 390 mμ. Titanium is determined photometrically using chromotropic acid (4, 5-dihydroxy-2, 7-naphthalenedisulfonic acid) for the development of titanium-chromotropic acid complex. The maximum absorbance of the color produced occurs at 420 mμ when the pH is adjusted to about 5. Moderate to large **(To page 182)**

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amounts of foreign ions do not interfere. Amounts as low as 5 p.p.m. of both metals in a single 2-g. polyethylene sample can be determined.

Determination of hydroxyl concentration in polypropylene glycols by infra-red spectroscopy. E. A. Burns and R. F. Muraca. Analytical Chem. *31*, 397-99 (Mar. 1959). A rapid method for determining hydroxyl concentration in polypropylene glycols by infra-red spectroscopy is described. The —OH stretching vibration of 14 different polypropylene glycols follows the Lambert-Beer-Bouger law with a coefficient of variation of 2.2%. The "effective" molar adsorptivity of the hydroxyl is calculated to be 6.74 g. per mole-mm. at a slit width of 0.012 mm.

Chemistry

Graft copolymerization by pre-irradiation technique. D. Ballantine, A. Glines, G. Adler, and D. J. Metz. J. Polymer Sci. *34*, 419-38 (Jan. 1959). Trapped free radicals are formed when polyethylene is irradiated with cobalt-60 gamma rays in the absence of any reactive species, oxygen, monomer, etc. The net free radical population formed increases with increasing total dose, decreasing temperature of irradiation, and increasing crystallinity of polymer.

Publishers' addresses

A. S. T. M. Bulletins: American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.
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Materials in Design Engineering: Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.
Plastics Institute Trans.: The Plastics Institute, 6 Mandeville Place, London W. 1, England.
Plastics World: Cleworth Publishing Co., 342 Madison Ave., New York, N. Y.
Product Engineering: McGraw-Hill Publishing Co., Inc., 330 W. 42nd St., New York 36, N. Y.
Rubber and Plastics Age: The Rubber and Plastics Age, 147 Grosvenor Rd., Westminster, London S. W. 1, England.
SPE Journal: Society of Plastics Engineers, Inc., 513 Security Bank Building, Athens, Ohio.
Z. Anal. Chem.: Springer-Verlag, Neuenheimer Landstrasse 28-30, Heidelberg, Germany.—End

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PE containers

(*From pp. 85-90*)

Material selection is a major consideration at Delaware Barrel for these large containers. "It is absolutely mandatory," feels VP Jerome S. Heisler, "for all polyethylene shipping containers under ICC government regulations for shipment of hazardous materials, that virgin polyethylene be used having a melt index of 2.5 g. per A.S.T.M. Test D-1238-52T. This maximum melt index was selected after years of field and laboratory tests. The lower the melt index, the better the physical and chemical properties under every condition—from static storage to actual shipment. Today, after 10 years of this polyethylene container standard, the choice of using melt index as a standard has been proved by millions of test shipments."

Centrifugal casting: In this process, not widely used in this country, dry, powdered polyethylene is held against the walls of a rotating, heated metal cylinder by centrifugal force. As the cylinder spins, the powdered polyethylene fuses into a tube-like structure. This is an economical process, since no complicated tools are involved; however, there are certain limitations in terms of shapes possible. Nevertheless, according to American Agile, which employs this technique along with other fabricating methods mentioned above, states that centrifugal casting lends itself particularly to production of large tanks requiring seamless shells up to 38 in. in diameter and 8 ft. long. The length can be cut to the customer's specifications and a polyethylene bottom welded to one end of the tube producing a finished tank or container.

Conclusions

It is evident from the preceding paragraphs that companies wishing to take advantage of the savings and other benefits offered by polyethylene tanks and containers have a wide variety of fabricating methods from which to choose. Some of the companies active in this field offer a number of stock units which may meet the requirements of the shipper or processor; in other instances, tanks or containers can be made up to meet the user's specifications. If the latter is the case, the production method to be used will depend largely upon the size and shape of the unit required, conditions of usage, and the number of containers or tanks needed. It should also be pointed out that, while stock containers generally do not go over 100 gal. in capacity, several producers in the industry are prepared to produce much larger sizes on special order from their customers.

For convenient reference, an accompanying table lists principal U. S. suppliers of large PE tanks and containers (15 gal. and upward) and briefly summarizes the range of sizes available. Most of these companies are also in a position to produce special types and sizes of polyethylene tanks and containers to meet the various requirements that may be called for by the user.—**End**

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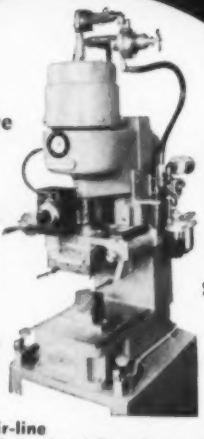

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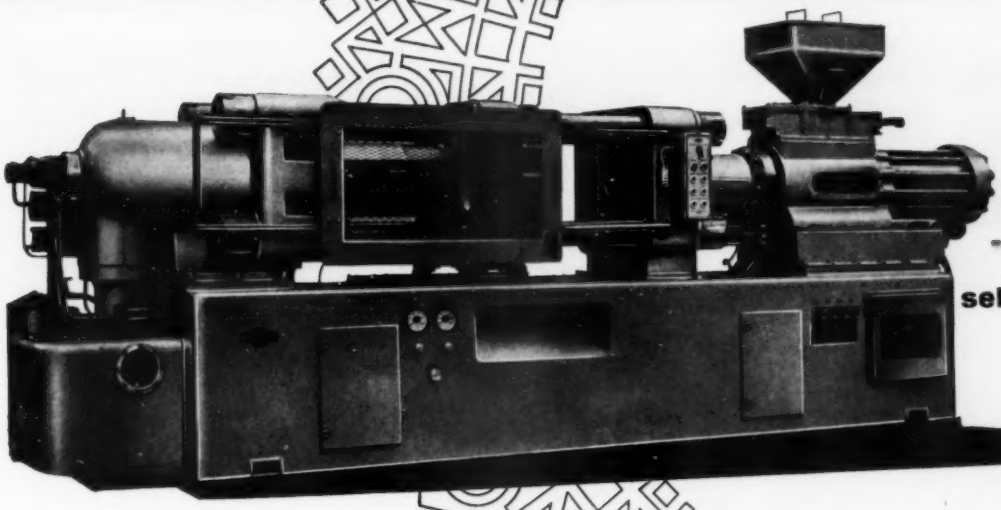

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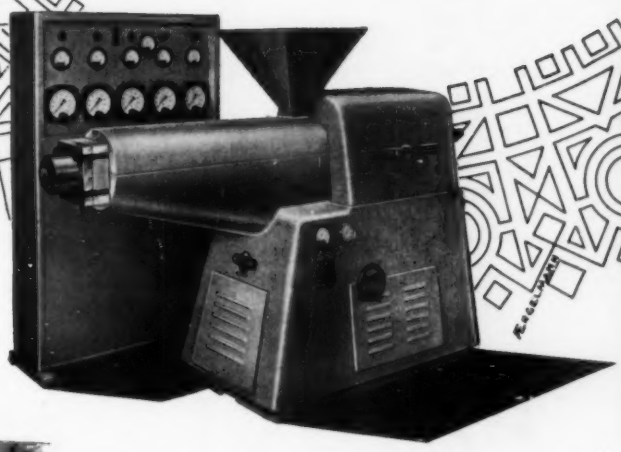

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Toro mower

(*From p. 94*)

for the Toro engineers to achieve a low-silhouette styling that could not be effected with metal; and the material's light weight contributed to a more balanced unit for easy handling. The high gloss of the polyethylene and its ability to be hot stamped also determined its selection.

Production economies

Once materials selection and parts design had been completed, Flambeau, with the assistance of Phillips Chemical Co., set about the job of designing molds and the production setup. The engine shroud is molded in a single-cavity, side-core, hot-runner mold with six gates. Because six gates are necessary to properly fill the part, considerable engineering research had to go into designing the mold so that the parts could be molded free from blemishes. Two molds are used for the discharge chute, each a single-cavity mold with a specially constructed sliding core mounted on ball bearings. This facilitates removal of the chute. A multiple submarine gate system is used on the two molds and, except for removal of the part, the entire operation is automatic. A two-cavity conventional mold, single-gated, with a side-core action for molding the hinge section, was used for the discharge deflectors.

All the parts are molded in the red color that Toro uses on all of its garden products and all additional decorations are hot stamped on. On the engine shroud, the hot stamping was successfully accomplished on a relatively large area—5 by 10 inches. For the discharge deflector, the hot stamping equipment was set up at the injection molding machine and the parts decorated as they come from the unit.

The results of this concentration of effectively engineering a difficult job speak for themselves—the polyethylene parts have not only done a job that would have virtually been impossible with other materials, but also they have done it within the desired cost limitations.—**End**

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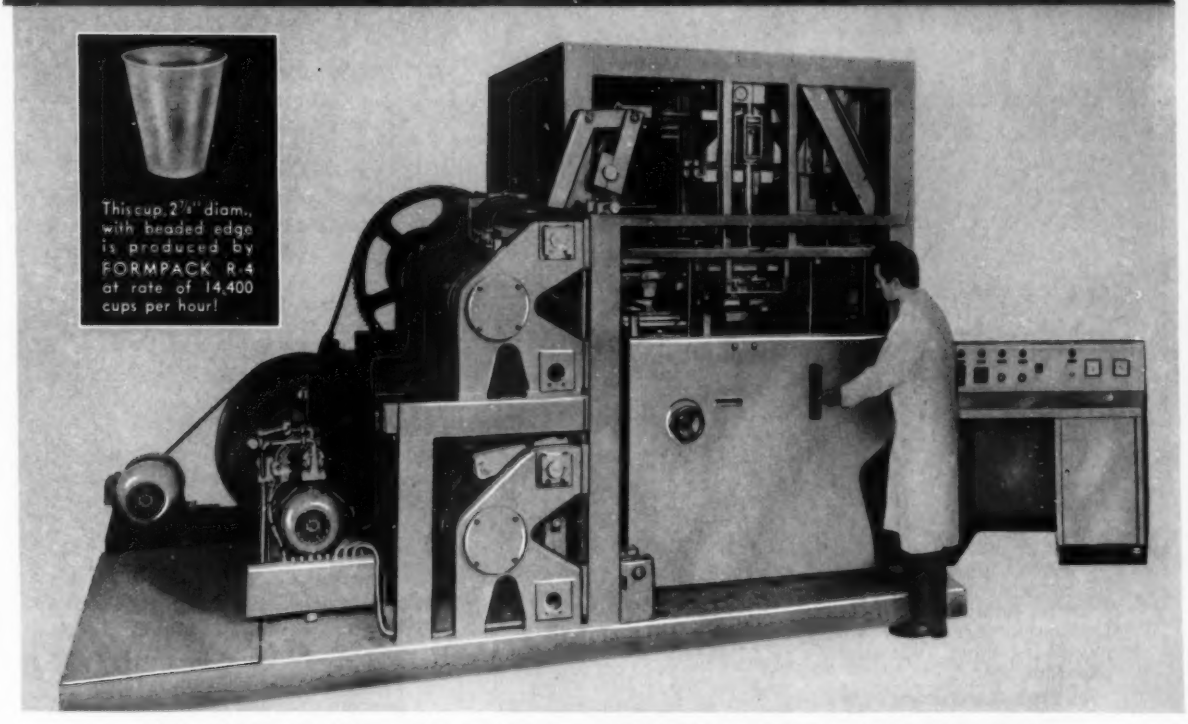

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Scrap

(From pp. 98-100)

any possibility of contamination since this system is a completely closed one.

It might be interesting to note here that a far higher percentage of scrap material can be mixed in with the virgin than can usually be used with repelletized scrap. The reason seems to be that in a repelletizing operation, the scrap is re-melted and extruded one extra time, which down-grades the material. An installation is shown in Figs. 2 to 5, pp. 98-99.

Note that in Fig. 2 an additional piece of equipment called a scrap-roll grinder is shown. In all film operations, a certain number of rolls are produced during a normal run which are not acceptable because they are off-gage, have holes, etc. The scrap roll grinder provides a means of using up this material as well. A scrap roll is fed into a set of nip rolls on the scrap roll grinder. These rolls are powered by a variable speed motor which enables the operator to pre-set the number of lb./hr. he wants to feed back into the extruder hopper where an agitator mixes it with the material coming from the grinder-blender-loader.

In a blown film operation where no edge trim is produced, the scrap roll grinder can be equipped with a virgin material feeder, making it a scrap roll grinder-blender-loader and, therefore, the scrap rolls and materials are used up in the manner previously described.

A further refinement not shown in this article is effected by the addition of a second vibrator and auxiliary hopper to the grinder-blender-loader. The purpose of this feeder is to add masterbatch coloring pellets for the purpose of coloring the film. The results of using a coloring unit have proven to be at least as good, and, in many cases, better than a tumbling operation; and there are many advantages of not having to tumble the material.

How to handle injection scrap

Illustrated in Fig. 6, p. 100, is a typical injection molding operation setup for complete automa-

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Tensile Strength, psi	20,300	21,300	20,100	19,300
% Elongation	1.89	1.24	2.03	1.87
Modulus of Elasticity in Tension, psi x 10°	1.15	1.36	1.45	1.85
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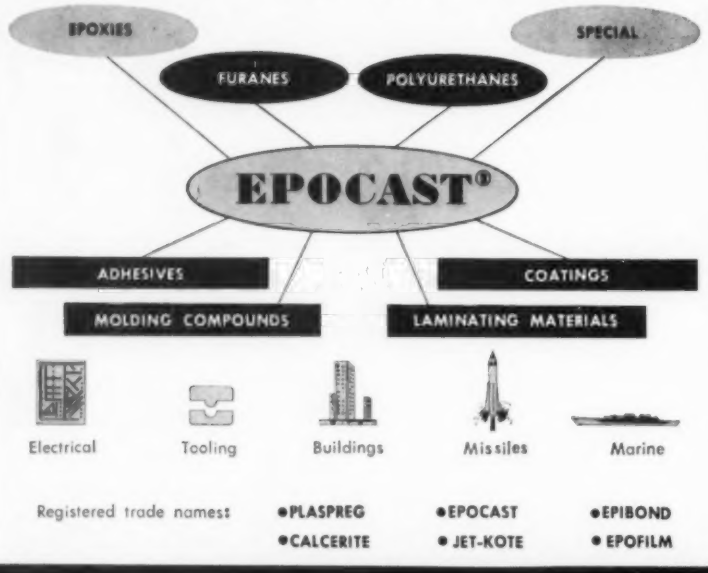

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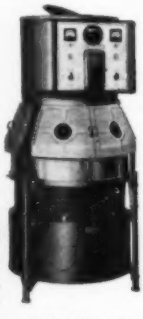

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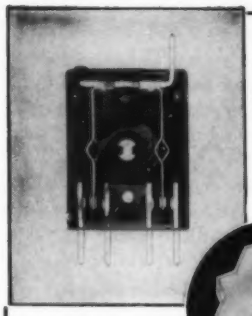
tion in scrap handling. While this particular setup shows a completely automatic molding operation, the arrangement works just as well if an operator were necessary to operate the press. The process is slightly different from handling extrusion waste since it does not involve a continuous strip of edge trim. The heart of the scrap handling system is a combination grinder-blender-loader which replaces the beside-the-press scrap grinder. The purpose of this unit is to receive the sprues as they are produced and grind them. As the scrap is ground, virgin material is added by a vibratory feeder at a rate which provides the correct amount of virgin, so that the total amount of virgin and scrap will approximately equal the output of the molding machine. The virgin material and the ground scrap meet in a mixing chamber under the grinder, and the mixture is then fed to the hopper on the molding machine. Since the feed of both the virgin and the scrap is a continuous one, perfect results are obtained. Loading of the virgin to the auxiliary hopper on the grinder-blender-loader and the conveying of the mixture to the machine hopper is done pneumatically and, therefore, it is necessary to replace the standard hopper on the molding machine with a cyclone hopper to prevent dusting. While compressed air can be used to operate this pneumatic loading equipment, it has been found desirable in many cases to use a separate air pump and motor, since shop air is usually heavily laden with moisture and contamination and, in many cases, not enough shop air is available.

No molding machine operates on an exactly uniform over-all cycle and because of rejects and slowdowns, etc., it is not possible to accurately preset the amount of virgin feed necessary. For this reason, a feeding system called a hi-lo feed is used. The machine hopper has mounted on it two extremely sensitive level switches and the vibratory feeder has two separate controls. These controls are set at feed rates higher and lower than the approximate amount of virgin material needed. If the level of the material in the



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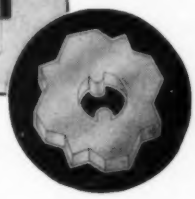

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hopper rises, it actuates one of these level switches and the feeder switches to the lower feed rate. This feed rate should be set low enough so that it feeds less material than the machine needs. When the material level in the hopper drops, the level switch in the hopper senses this and the feed reverts to the higher rate.

In manual molding, as the mold opens and the parts drop out, the operator places the sprue on the conveyor and it is carried into the grinder. The speed of the conveyor is set so that the sprue will have a chance to cool and harden before it drops into the grinder. The grinder hopper is designed to prevent flyback so that particles of ground material cannot fly out and cause waste. When running automatically, scrap is discharged directly onto the conveyor.

Who should use it?

The question naturally arises as to whom equipment of this type applies and what are the maintenance problems to be expected.

Although it is difficult to say who should and who should not install a system, a good rule of thumb for injection molders seems to be that if the average job runs for more than two weeks, this equipment is economical and pays for itself within a short time. A typical installation for a machine in the 6- to 24-oz. range would run approximately $3000, including conveyors, etc. However, it should be remembered that included in this figure is an amount of about $1000 for a necessary grinder.

For film or sheet extrusion, the point at which automatic scrap handling becomes almost an economic necessity is an output of about 200 lb./hr. The cost of a complete installation runs from $2000 to $3500 depending on the extruder output, the complexity of the installation, and the percentage of scrap to be used.

One of the most important items to be considered in evaluating the economics of an automatic scrap-handling system is the amount of down time to be expected due to cleaning and repairs. This factor is even more important with this equipment, since in most cases the production machines cannot run until the auxiliary equipment is ready for operation. The entire setup is designed for minimum maintenance and rapid cleaning.

If routine preventative maintenance and inspection is enforced, such as filter cleaning, greasing, etc., the effective life of this equipment should be equal to the life of an ordinary grinder. The entire setup can be covered in approximately 45 min. and should be done once a week.

Cleaning and changing colors present practically no problem, since the entire system is built around a standard modern beside-the-press-grinder. The time needed to completely clean the system is about the same as cleaning a standard grinder plus a pneumatic hopper loader.

Having your scrap disappear back into the product without reprocessing costs, handling, or contamination represents a great step forward in over-all cost reduction planning.—**End**

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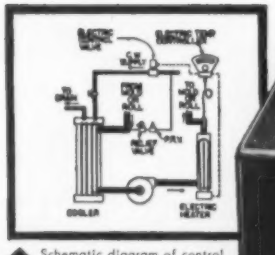

▲ Schematic diagram of control circuit in the Sarcotrol Model MC-1, Single Unit. Model MC-2, Dual Unit, is equipped with two of these circuits. Model MC-3 has three complete circuits.

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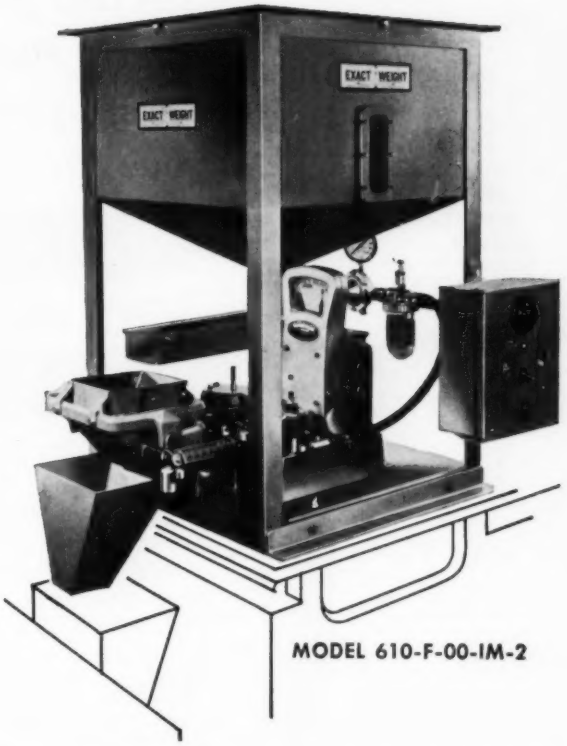

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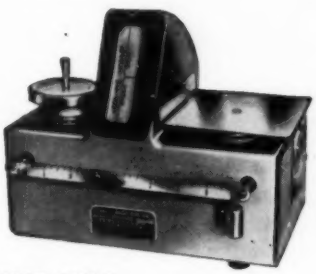

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HARFLEX 330 is close to being the ideal polymeric plasticizer. In addition to the above features, it has good resistance to migration into lacquers and varnishes and also to extraction by water, soapy water, oil and gasoline.

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EQUIPMENT • SUPPLIES • SERVICES

EXTRUSION CUTTER. Literature describes a precision machine for cutting extruded tubing or shapes to exact length. Machine cuts up to 7,000 pieces per min. in lengths from 1/32 in. and diameters up to 1 inch. Foster & Allen, Inc. **(F-901)**

ELECTRONIC SEALING MACHINES. Illustrated literature describes line of electronic heat sealers and generators. Includes 2-post, 4-post and guillotine presses, a 250 watt rotary sealer, and generators with from 1 to 12 KW. output. Mayflower Electronic Devices, Inc. **(F-902)**

PLASTICS MIXERS. Illustrated calatlog describes company's line of 1 to 300-gallon plastics mixing machines. Discusses operating features and includes specifications. Paul O. Abbé, Inc. **(F-903)**

FILM EXPANDER. Illustrated data sheet describes construction, special features and operation of an anti-wrinkle slat expander, suitable for installation on web processing equipment. Progressive Machine Co. **(F-904)**

POLYESTER RESIN FACT FILE. Folder describes company's line of polyester resins, giving physical and chemical characteristics, processing methods, applications. American Alkyd Industries. **(F-905)**

LABORATORY VACUUM FORMER. Data sheet describes portable, hand-operated vacuum forming machine suitable for laboratory use. Has 2-in. depth of draw and handles 10 by 10-in. sheet sizes. Precision Products. **(F-906)**

CARBIDE-TIPPED CIRCULAR SAWS. 8-page folder illustrates and describes line of carbide-tipped saw blades for specific plastics cutting requirements. Forrest Mfg. Co., Inc. **(F-907)**

DRY COLORANTS FOR POLYSTYRENE, POLYETHYLENE. Brochure describes company's pre-lubricated dry colorants for polystyrene, high-impact styrene and polyethylene. Colorants can be used without wetting agents. Price list included. Riverdale Color Co., Inc. **(F-908)**

ROTATIONAL MOLDING OF PLASTISOLS. Literature describes unit for rotational molding of vinyl plastisols. Machine consists of gas-operated oven with two 24- to 30-in. diameter mold holders mounted on a planetary drive. Accessory equipment also described. Mercury Conveyor, Inc. **(F-909)**

INJECTION PRESS. Illustrated folder describes and lists features of a 2¾-oz. injection press. Also describes this company's lines of compression presses. Clifton Hydraulic Press Co. **(F-910)**

PVC PIPE. 4-page price list tabulates available sizes and pressure ratings of line of unplasticized polyvinyl chloride pipe stocks, with high chemical or impact resistance. Alpha Plastics, Inc. **(F-911)**

EXTRUDING EQUIPMENT. 6-page illustrated brochure describes a line of 1- to 8-in. thermoplastic extruders. Machines feature balanced heat control, quick-opening die gates and torpedo-type screws. National Rubber Machinery Co. **(F-912)**

VINYL STABILIZER. 4-page brochure describes a vinyl stabilizer that minimizes performance variation, due to resin or plasticizer or filler, and eliminates storage problems due to exposure of a stabilizer or compound to oxidation or moisture. The Harshaw Chemical Co. **(F-913)**

FOAM PRODUCING RESINS. Technical bulletins describe a resin that will produce a flexible polyurethane foam for slab stock, and seating and cushioning applications; also a resin for producing "Freon" blown film with good sound and heat insulation properties. Pelron Corp. **(F-914)**

HIGH-SPEED CUTTERS. 8-page illustrated brochure describes this company's lines of automatic machines for cutting plastic materials, rubber, textiles, etc., without distortion, whether they are hot, cold, wet, dry, or sticky. Wink Div., The Motch & Merryweather Machinery Co. **(F-915)**

EPOXY PLASTICIZERS. 4-page technical bulletin describes three epoxy plasticizers, designed to give vinyl compounders high protection against heat and light deterioration. Emery Industries, Inc. **(F-916)**

ELECTRIC CARTRIDGE HEATERS. Illustrated catalog sheet describes features of a line of electric cartridge heaters for stud heating, stress-relieving, extruding metals, and metal forming. Includes specifications, prices. Edwin L. Wiegand Co., Inc. **(F-917)**

NON-STAINING VINYL SHEETING. 4-page illustrated brochure describes a white vinyl metal laminate said to be completely non-staining. Sheeting makes possible linen, leather, lustrous finish effects on appliances. Columbus Coated Fabrics Corp. **(F-918)**

RIGID VINYL FOR EXTRUSION. 12-page illustrated brochure presents design advantages, chemical immersion data and applications for two unplasticized compounds, consisting of high molecular weight polymers compounded with stabilizer, lubricant and pigment. B. F. Goodrich Chemical Co. **(F-919)**

METALLIZING PLASTICS. Technical sheet discusses metallizing of plastic toys, medallions, zipper pullers, electrical parts, buttons, novelties, etc., with gold, silver, copper, etc., finishes. Planet Plating Co., Inc. **(F-920)**

SMALL LAMINATING PRESSES. 4-page illustrated brochure describes a line of hand-operated presses for laminating cards, passes, badges, photos, charts, tags, etc., with plastic at rates up to 150 pieces per hr. Fred S. Carver, Inc. **(F-921)**

THERMOFORMING MACHINES. Illustrated brochure describes lines of single- and double-stage machines for forming high density linear polyethylene and conventional rigid thermoplastic sheets. Aer-O-Flow Industries, Inc. **(F-922)**

COMPOUNDING MACHINE. Illustrated technical data sheet describes a machine for producing general purpose, high-impact and mineral-filled phenolic compounds in batch capacities up to 40 lbs., and in hourly capacities up to 1,200 lbs. Beardsley & Piper, Div. Pettibone Mulliken Corp. **(F-923)**

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EQUIPMENT • SUPPLIES • SERVICES

PLASTIC SHEETING EQUIPMENT. Illustrated technical data sheet describes this company's dies, polish roll stands, sheets, stackers, dryer-blender-extruder hoppers and sheet glazers. Goulding Mfg. Co. **(F-924)**

METERING-MIXING MACHINE. 4-page illustrated folder describes a machine for metering, mixing and dispensing epoxies, polyesters, polyurethanes, etc. Machines provide for single shot sizes up to 1 pt. and larger. Automatic Process Control. **(F-925)**

SLITTING AND REWINDING MACHINES. 8-page illustrated brochure describes lines of German-built slitting, rewinding, spooling and shredding machines for cellophane, acetate, polyethylene, P.V.C. film, wax papers, etc. Also describes longitudinal and lateral stretching plants. Inta-Roto Machine Co. **(F-926)**

POLYETHYLENE GUIDE. 32-page illustrated booklet discusses nature and basic resin characteristics of polyethylene; also environmental effects on this material. Also discusses polyethylene's applications in film, moldings, pipe, coatings, etc. Outlines history and services of company. Spencer Chemical Co. **(F-927)**

INJECTION MACHINE NOZZLES. 56-page illustrated catalog describes this company's stock replacement and special-purpose injection machine nozzles. Gives prices and tells how to measure for special nozzles. Injection Molders Supply Co. **(F-928)**

DOUBLE ROTATION OVENS. 4-page illustrated brochure describes a double rotation oven for the molding of vinyl plastisols. Unit, which accommodates two aluminum mold plates simultaneously, features horizontal loading door and hinged access door. Brochure also describes auxiliary equipment. E. B. Blue Co. **(F-929)**

GLASS-FILLED NYLON MOLDING COMPOUNDS. Technical sheet gives test data on mechanical, thermal, and electrical properties of three different types of this company's glass-filled nylon molding compounds. Fiberfil, Inc. **(F-930)**

PIGMENT DISPERSIONS. Brochure and accompanying color chip chart give mixing, pre-mixing and price information on this company's color paste dispersions for polyesters, epoxies, acrylics, etc. Pigment Dispersions, Inc. **(F-931)**

PLASTIC WELDING EQUIPMENT. 8-page illustrated catalog describes and gives prices for this company's torches for the welding of plastic sheet, pipe, cables, film, prototypes, etc. Also lists accessories, custom fabricating services. D&R Plastic Welders, Inc. **(F-932)**

PLASTISOL VISCOSITY DEPRESSANT. Technical data sheet describes a plastisol viscosity depressant said to improve heat stability, air release, and aid in the dispersion of pigments and fillers. Plastics and Chemicals Corp. **(F-933)**

POLYSTYRENES. 24-page illustrated bulletin discusses lines of normal and modified polystyrenes. Describes applications, properties, design considerations, fabricating techniques, and finishing operations. Plastics Div., Koppers Co., Inc. **(F-934)**

AUTOMATIC INJECTION PRESSES. Illustrated literature describes 2½-, 3-, and 4-6-oz. automatic injection presses. Units feature up to 720, 1200 and 840 cycles per hr., respectively. The Van Dorn Iron Works Co. **(F-935)**

CONVEYORS. Companion illustrated brochures describe and give case histories of a roller conveyor with automatic elevator, a chain conveyor, roller and incline-pusher conveyors, vertical conveyors, etc. C. M. Wilkinson Co. **(F-936)**

HOT STAMPING PRESSES. Series of illustrated technical bulletins describe motor-driven hot stamping presses for numbering and lettering, tags, nameplates, plastic mounts, cutlery handles, etc., both black and in color. Arcromark. **(F-937)**

MOLDING MATERIALS IN COLOR. 6-page data file folder contains price schedule for lines of this company's synthetic resins now available in standard colors. Materials are for molding, extruding, calendering, and vacuum-forming. Marbon Chemical, Div. of Borg-Warner. **(F-938)**

CHEMICAL TESTING SERVICES. 4-page illustrated brochure describes this company's services as an independent laboratory for chemical analysis and testing, research and development. Chemical Div., U. S. Testing Co., Inc. **(F-939)**

POTTING COMPOUND. Technical sheet describes a polyester coating and potting compound, said to cost less than epoxies and to considerably reduce cure time. Naugatuck Chemical Div., U. S. Rubber. **(F-940)**

GENERATORS AND PRESSES. Illustrated data sheets describe a 1 KW generator with 2-post press and a 2 KW generator with 2-post press. Generators are single phase, 50-60 cycle. Presses are standard 2-post models with adjustable pressure control. Mayflower Electronic Devices, Inc. **(F-941)**

CHECK LIST FOR PURCHASING CUSTOM MOLDED PLASTICS. Technical report contains 14-question check list, pointing out ways manufacturers can make savings in the purchase of custom-molded components. Plastics Div., Monsanto Chemical Co. **(F-942)**

SLIP AND ANTI-STATIC AGENT. Illustrated 4-page brochure describes an agent that prevents static, tackiness and blocking during the extrusion and molding of polyethylene. Agent has a light color, low fatty acid and low soap content, low toxicity, etc. Fine Organics, Inc. **(F-943)**

INJECTION MOLDING MACHINE. 4-page illustrated brochure describes automatic injection molding machine with a capacity of up to 50 grams and a plasticizing rate of 60 lbs. per hr. Machine has a high-speed, 75-ton toggle clamp. Improved Machinery, Inc. **(F-944)**

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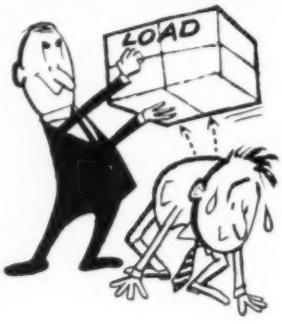

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Urethanes

(From pp. 101-104)

from 100% urethanes to oil-modified vehicles, are available.

The value of a coating is based on the cost per square foot per year. This formula takes into account the cost of *applying* a coating, (sometimes up to 10 times higher than the price of the coating *material*). The economics of urethane coatings are, therefore, based on their superior performance characteristics. Here are typical cases:

- A coating for the municipal sewage treatment plant in San Diego, Calif. was still in perfect condition after six months, whereas the best finishes used previously lasted a maximum of 2 weeks. The urethane material supplied by Poly-Form Mfg. Co., Escondido, Calif., for this outdoor application, had to withstand constant sun-bleaching and weathering action, high concentrations of corrosive gases, salt spray, and coastal fogs.
- Three coats of a urethane finish for bowling pins, supplied by Howe & French, Inc., Weymouth, Mass., lasted three times longer than seven coats of a conventional lacquer finish.
- An anti-slip surfacing material developed by BB Chemical Co., Cambridge, Mass., where the urethane coating also acts as binder for the abrasive particles, is competitively priced with epoxy materials (about 25 to 30¢/sq. ft.) However, it cures faster, so that an area can be resurfaced more rapidly. This is very important, since this application is in heavy-traffic areas. It can also be used at lower temperatures than epoxies.
- Instead of replastering an eight-year-old terrazzo swimming pool, which was badly stained, cracked, and showed signs of leaking, a Poly-Form urethane coating was applied. Initial savings were $3000, but the low maintenance required for these coatings will result in even greater economies over the years.
- Extremely fast recoat and set-up time on dance floors, in gyms, factories, and in residential work, is reported by Cargill, Inc., Minneapolis, Minn. Using the company's #101 oil-modified

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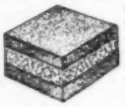
SMART SANDWICH FOR DESIGNERS . . . In some cases, Troy Tuf Dacron* can be used as a veil or overlay in combination with other materials.



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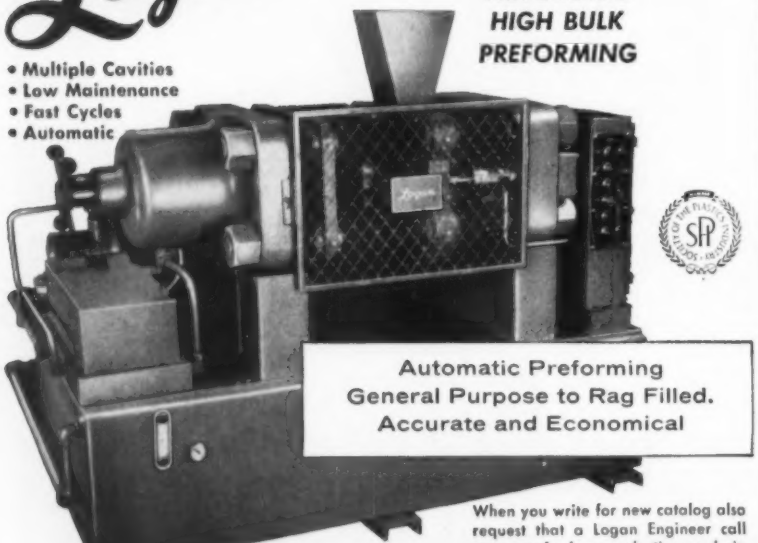

Automatic Preforming
General Purpose to Rag Filled.
Accurate and Economical

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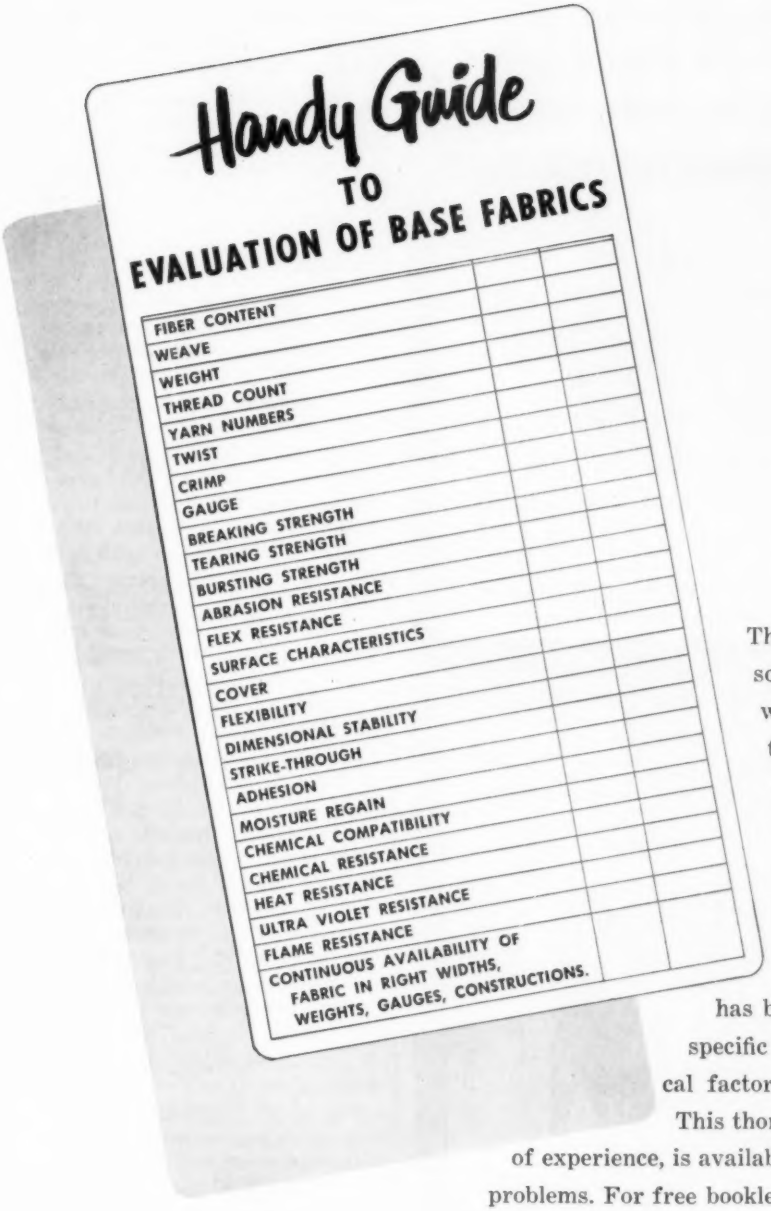
urethane coating, a contractor was able to buff and apply a second coat over a wooden floor 4 hr. after the first coat was applied.

Du Pont's Fabrics & Finishes Div. markets a special oil-free floor finish for textile mills which has demonstrated two to three times the wearability of conventional first grade floor varnishes. In addition, lint, starch, and dirt do not stick to it, making cleaning easier and less expensive.

The high gloss retention of urethane coatings points the way to light-color durable floor finishes. Poly-Form cites a case in a newspaper plant, where conventional black floor coating was used to provide heavy-duty finishes. With urethane, a light gray could be employed because it does not soil easily, resulting in a 50% reduction in the amount of electricity consumed for lighting.

Patent leather may soon be used for utility footwear instead of merely for dress shoes, because urethane finishes provide up to 25 times longer wear than linseed oil varnishes currently used. In addition, urethane provides more flexibility and resistance to cracking, even at freezing temperatures, remains glossy, is water-resistant, and its superior toughness makes factory handling much easier. It is expected that sales of patent leather will rise to 300 million sq. ft. per year over the next decade. This is more than seven times higher than the present demand. UBS Chemical Corp., BB Chemical Co., both in Cambridge, Mass., and Thiokol Chemical Co., Trenton, N. J., are among the companies that are supplying the shoe trade with these new finishes.

In electrical applications, urethane coatings eliminate the cost of pre-stripping of magnet wires. They also simplify coil assembly procedure because soldering does not destroy the insulation back from the actual connection. Anaconda Wire & Cable Co.; Inca Mfg. Div., Phelps Dodge Copper Products Corp.; General Electric Co.; Schenectady Varnish Co., Inc.; Carwin Polymer Products, Inc.; and Howe & French, Inc.; are among companies active in this field. BB Chemical Co. has



This fictitious "guide" has been created solely to show some of the factors which often have to be considered in the selection of a base fabric. They serve only to point up one fact: that there can be *no* such thing as a put-it-in-your-pocket guide in this field. But one thing is certain: when you're guided by Wellington Sears, you know that your base fabric has been considered in the light of your specific need, and that all significant technical factors have been thoroughly examined. This thoroughness, plus more than a century of experience, is available to help solve *your* working-fabric problems. For free booklet, "Fabrics Plus," write Dept. **K-6.**

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For *accurate* separating and sizing of plastic resins and other free-flowing granular materials—by *width* or *thickness*. Precision Graders separate by means of cylinders of unique designs with either round or slotted perforations. Various models and sizes—including multiple units—are available.

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For *accurate* separating and sizing by *length*. Carter Disc Separators vary in the number of discs and the size of the disc pockets. These pockets accurately lift material which is shorter, positively reject longer material. Laboratory demonstration tests are free.

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SIMON-CARTER CO.
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developed a coil dope which will impregnate finely wound wires up to a depth of ½ in. at atmospheric pressure. In addition to eliminating the necessity of vacuum impregnation, it also cures rapidly without a baking cycle.

As rubber finishes, these coatings provide great flexibility and adhesion, in addition to good chemical and solvent resistance. Also, the abrasion resistance of a thin urethane coating reduces the sticky properties of rubber gaskets or moldings which often come into contact with a variety of other surfaces.

Outlast all others

All suppliers of urethane coatings cite many instances where these materials have outlasted all other coatings used previously. For instance, Saran Protective Coatings Co. supplied a urethane coating to protect a concrete floor from organic solvents and hydrofluoric acid. Epoxies and vinyls failed in this application. Urethane coatings supplied by Chemical Coatings & Engineering Co., Inc., Media, Pa., have outlasted all other previously used materials on heating coils in various types of chemical tanks.

In addition to the companies mentioned, Special Products Div., Lord Mfg. Co., Erie, Pa.; Spencer Kellogg & Sons, Inc., Buffalo, N. Y.; The Kansas Paint & Color Co., Wichita, Kansas; Better Finishes & Coatings, Inc., Newark, N. J.; Ferbert-Schorndorfer Co., Div. of American Marietta Co., Cleveland, Ohio; Steelcote Mfg. Co., St. Louis, Mo.; Finishes Div., Interchemical Corp., Newark, N. J.; Pittsburgh Plate Glass Co., Pittsburgh, Pa.; and Tex-Chem Co., Fairlawn, N. J.; also supply coatings.

For many applications, performance data are not yet available. But even within a matter of months, the testing of urethane coatings that is now under way is expected to make possible a break-through for some volume uses. The present developmental quantities and specialized applications are expected to grow to sales of 10 million lb. of urethane coatings in the next 5 years. Here, too, urethanes are definitely growing up.—**End**

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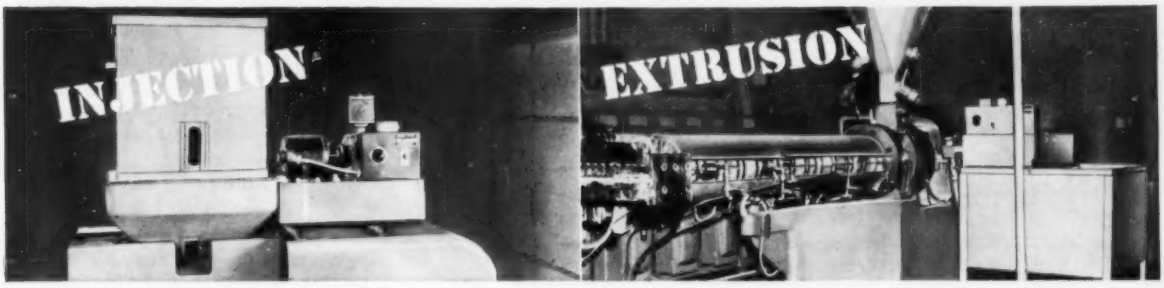

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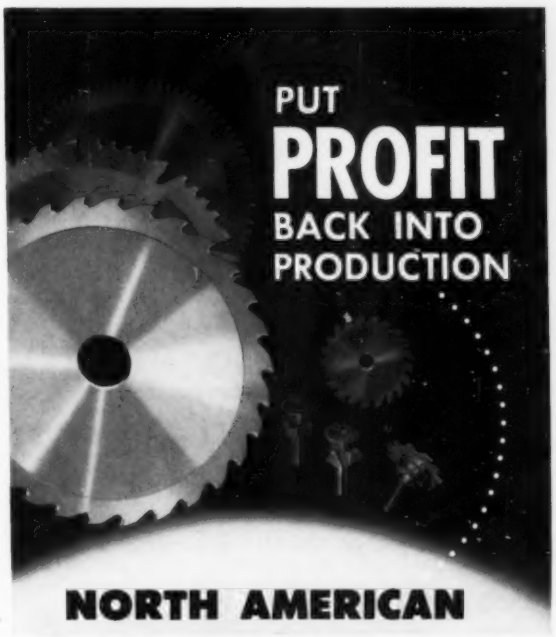

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Truck payload up

(From page 105)

line, which Apex is now setting up, two spinning mandrels with a load station between the two are used. Fibrous glass mat is first cut to size and wrapped around a cylinder known as a stovepipe. This entire unit is then inserted into one of the mandrels at the load station and the stovepipe is removed, thereby leaving only the glass mat inside of the mandrel.

The mandrel then kicks off to one side and into heated oven. As the mandrel starts to spin, a hollow rod connected to a polyester resin tank is inserted into the center of the mandrel. Resin pours out of the front nozzle as the rod traverses back and forth, impregnating the glass mat. Centrifugal pressure, of course, flattens the fibrous glass down uniformly against the inside surface of the mandrel while, at the same time, it forces the resin through the lay-up. Heat is applied to the mandrel while it is spinning so that, after 10 min., the part is fully cured. The mandrel is then kicked back to the loading station, where a knockout device ejects the finished reinforced plastics tank.

In the meantime, the second mandrel has been loaded in the center station and similarly moved over to the second heating oven so that both mandrels are continuously in operation.

The wall thickness of the tanks is 3/16 in. and Apex claims that by using the centrifugal molding process they can control it within a tolerance of ±0.005 to 0.010 inch. The fibrous glass mat is carefully weighed out for each tank and a special piston pump controls the metering of the resin into the lay-up.

End caps matched-metal molded

To complete the tanks, Apex match metal molds the end caps that go over each tank. These caps are about the same wall thickness as the tanks with a slight "beefing up" in the center to accommodate the metal fittings that are going to be used.

A slight depression is molded into the edges of both the end caps and the tanks. Thus, when the two parts are fitted together, the depressions are matched up to form an annular groove. Resin is forced into a small hole at one end of the groove so that it folds completely around the piece and out a second small hole at the other end of the groove. When the resin has been allowed to cure, a void-free solid joint that exhibits exceptional strength is effected to hold the two pieces permanently together.

Although the tanks were especially designed for the truck transport industry, they seem a logical contender for automobiles, airplanes, trains, or wherever else a similar tank construction may be useful—especially if anticipated volume can knock off the premium price and effect the triple-barreled advantage of reduced cost, increased payload capacity, and more functional value.—**End**

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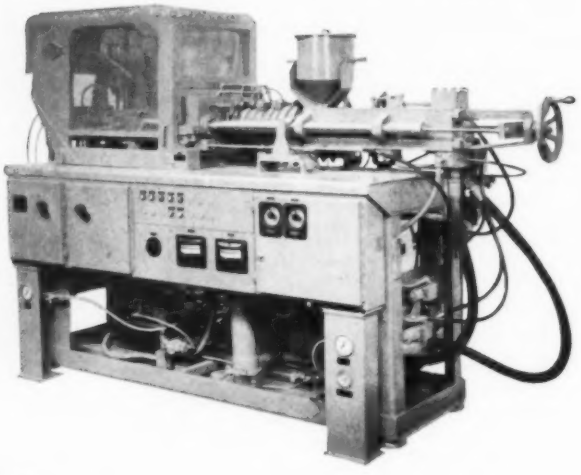
*dependent on material and mold construction



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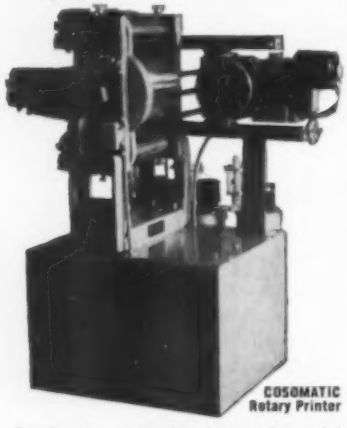
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Ford

(*From p. 128*)

and reciprocate. The rather deep flights of the screw are slotted so as to work in conjunction with three rows of stationary teeth attached to the barrel. With each turn, the screw advances as it turns and then retracts to the starting position while the stationary teeth pass through the slots in the screw. As a result, the material travel is a combination of normal drag flow and sudden lengthwise displacement of substantial gobs from one flight to the adjacent one. Thus the path of the mix is a series of interlacing loops. As the fixed teeth pass through the slots, the material caught in the small clearances between slots and teeth is subjected to high shear that aids in dispersing the filler in the resin. Because of the large number of teeth, it is possible to achieve a high degree of mixing and dispersion in a fraction of the dwell time required by batch-type intensive mixers.

Sequence of operations

Raw materials involved in the Ford operation include sisal fibers, calcium carbonate, clay, asbestos, and polyester resin. The resin is delivered to the plant in tank trucks and piped into two 5000-gal., upright-type, steel storage tanks. The fibers and fillers are emptied into hoppers which constitute the first stage of the automation line.

The line is compactly arranged in a 40-ft.-square room. A photograph of the entire set-up appears in Fig. 2, p. 128. The sisal fiber line feeds into an inclined conveyor leading from the storage bin up to a feeder that drops the fiber onto a continuous conveyor traveling at right angles toward the continuous mixer hopper.

Pneumatic tubes are used to bring the other dry raw materials from their respective storage hoppers to feeders over the same conveyor line servicing the fiber feeder. The feeders meter the constituents then dribble them in sequence onto the fiber as it passes along the conveyor to the mixer.

The resin is pumped automatically from the storage tanks in cor-

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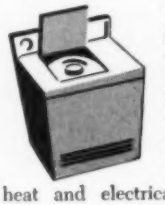

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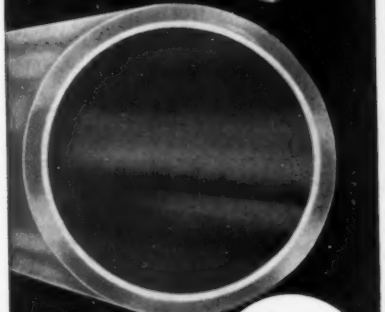

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rect amounts to two resin mixers, where a lubricant, pigment, and a catalyst are added, all at room temperature. From the mixers, the slurry is then metered and pumped directly to the mixer hopper. At the mixer hopper, the dry materials converge with the resin and drop into the continuous mixer.

To prevent pre-curing of the mix, the mixer is jacketed and chilled with refrigerated cooling water supplied by an automatic cooling unit. The coolant carries away the heat generated by the viscous working of the mix and brings its exit temperature down to 40° F.

From the mixer, the mix is delivered to an extruder whose function is to shape the premix to a specific "rope" diameter. The "rope" is automatically cut off by a photo-electric eye controlled cut-off unit, to a predetermined length and, thereby to a controlled weight. The cut billets are placed on pallets and trucked to the molding presses. Ford molds the plenum-chamber housings and the blower housings in three 2-cavity molds.

The inclined conveyor for the sisal is about 20 ft. long and 18 in. wide. It carries the fibers up to a Bramwell-type feeder that lays out the material as a mat in weighed amounts on the transfer conveyor going to the mixer. The transfer conveyor is 27 ft. long, 20 in. wide, and travels at an adjustable speed set for this job at 12 ft./min.

The pneumatic system is powered by a compressor, located outside the building wall. From the compressor, the pneumatic lines go under the floor and up through the individual raw material bins. Material in each bin is sucked into the pneumatic tube by means of a rotary type valve on an as-needed basis. Materials going into the feeders over the material transfer conveyor are also similarly automatically controlled.

Omega feeders are employed to measure or weigh out the calcium carbonate, asbestos, and clay with an accuracy of ± 2 percent. Because of this accuracy of feed and the intimate mixing, control of product uniformity is built into the process.—**End**

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Isophthalic polyesters

(From pp. 135-138)

along with high wet strength and a high modulus. It has been difficult to pass this specification without the use of isophthalic acid.

Moldings of isophthalic resins show good resistance to cracking, crazing, and fatigue failure in addition to their ability to provide high physical strength. Furthermore, the cured resins are more stable thermally than resins based on phthalic anhydride. This in turn improves their resistance to paint baking cycles, making them somewhat less troublesome to paint. This combination of properties has led to the use of isophthalic resins in large matched-die, preform-type moldings such as the Chevrolet Corvette body, the Cushman Mailster, the White truck cab, the lapstreak type of pleasure boat, and aircraft baggage containers, and many smaller applications.

Isophthalic resins can be formulated into room-temperature-curing systems. Resins of this type have been used in pleasure boats, fume ducts, body putties, and corrosion-resistant coatings for steel tanks. The chemical and water resistance of these resins makes them suitable for protective coating materials for concrete, such as around salt water.

Isophthalic resins are being used in "prepregs." These are said to be replacing epoxies and phenolics to some extent for commercial uses in aviation as well as military uses. Isophthalic resins are being used in the Albee Rollingen "Arc," an ingenious vehicle for off-road uses. They are also reported to be finding uses in the adhesive and electrical fields.

The manufacture of polyester resins containing isophthalic acid is considerably more difficult than the manufacture of conventional polyester resins. The extremely high polyester viscosities have required improved manufacturing techniques as well as equipment modifications. Polyester resins are extremely sensitive to the presence of minute amounts of certain impurities, and this is more serious with resins of the isophthalic type.

From the molder's viewpoint, resins based on isophthalic acid handle just like conventional materials. No changes in tooling or manufacturing procedures are required just to accommodate this class of resins.

Until recently, a mol of isophthalic acid was considerably more expensive than a mol of phthalic anhydride. Costwise, this was partially compensated for by the higher viscosity of some of the isophthalic polyesters which necessitated the use of more styrene to obtain a workable resin viscosity. The recent price changes have resulted in the cost of the phthalic component in a resin being practically equivalent, whether this be from ortho or iso starting material. At this point it seems certain that much of the immediate growth of the unsaturated polyester styrene resin field will be in the area of isophthalic resins.—**End**

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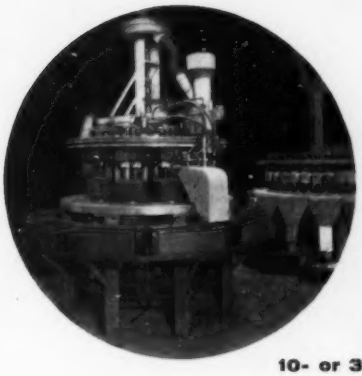

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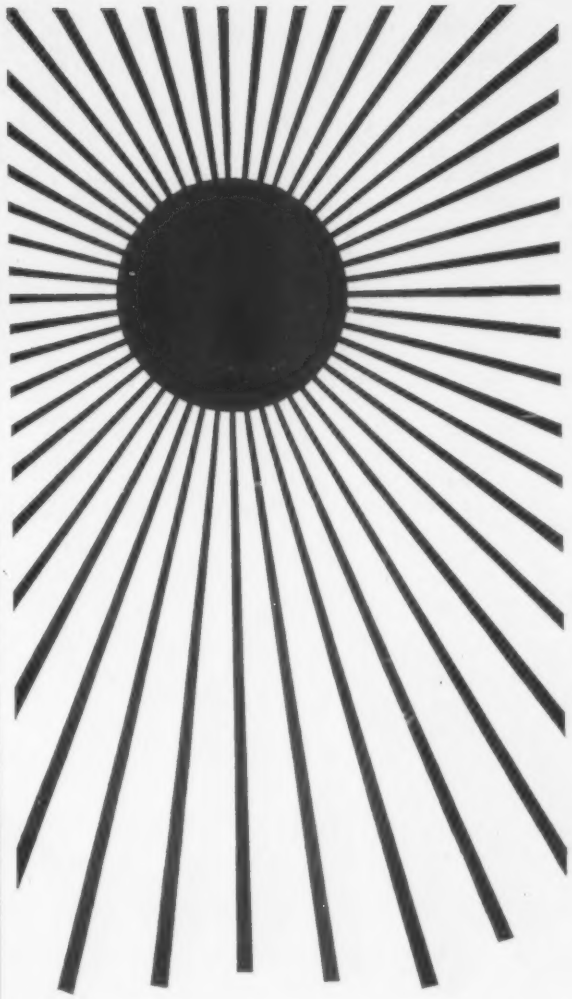

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TYPICAL PROPERTIES OF DPD-7365

Property	Value
Melt Index, g/10 min.	8
Density, g/cc at 23°C	0.935
Secant Modulus, psi	40,000
Tensile Strength, psi	1600
Elongation, %	210
Yield Strength, psi	1500
Brittle Temperature, °C	
50% OK	−70
80% OK	−60
Stress Cracking Resistance	
50% Failures, hours	>336
Mechanical Flex Life,	
No. of Flexes	200,000

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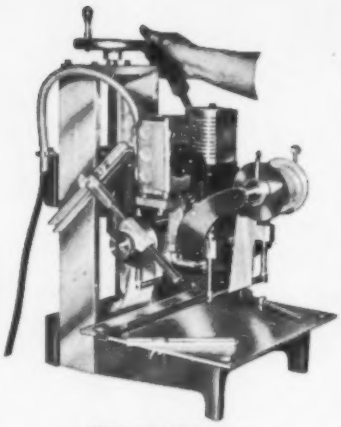

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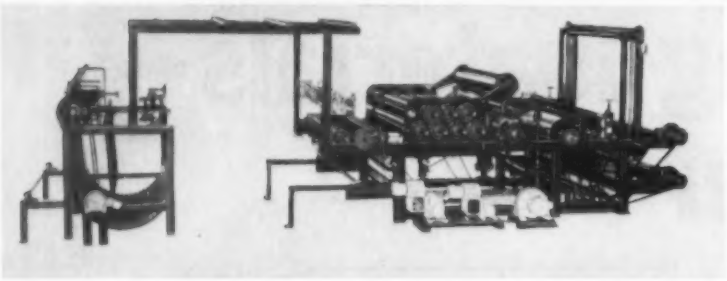

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Stress cracking

(From pp. 140-146)

5. For type *B* polyethylenes in general, as well as for those polyethylenes of type *A* with a melt index ≥ 2, the action of Igepal CO 630 when put in a 10% aqueous solution is slower than that of concentrated products. However, by conditioning at 50° C., it is possible to keep the breaking times within practical limits.

Thus, the use of a 10% aqueous solution of Igepal CO 630 as a reagent in stress-cracking tests is to be preferred to this same product in the dry state. Furthermore, in view of the considerable hygroscopicity of Igepal CO 630, it is not easy to use it in the dry state as prescribed in the proposed A.S.T.M. method. It could well be, however, that the unsatisfactory reproducibility of the results is to be attributed to this fact.

This paper has been prepared in the Research Laboratories of Pirelli Societá per Azioni, Milan. The authors would like to extend their thanks to the management of this company for giving us the permission to publish this material.

References

1. J. B. De Coste, F. S. Malm, and V. T. Wallder, Ind. Eng. Chem. *43*, 117-121 (1951).

2. "Proposed tentative method of test for environmental stress cracking of ethylene plastics," A.S.T.M. Bulletin No. 218, 25 (Dec. 1956.) Editor's Note: For additional information see also "A.S.T.M. Standards on Plastics," Appendix 1 (1958).

3. K. Kaufmann, Modern Plastics *34*, 146-148, 232 (Feb. 1957). Editor's Note: see also Modern Plastics *36*, 146-151, 174 (Mar. 1959).

4. R. A. V. Raff and J. B. Allison, "Polyethylene," Vol. XI of High Polymers Series (Interscience Publishers, Inc., New York), page 293 (1956).

5. G. Palandri and U. Pelagatti, "Il polietilene e la sua applicazione ai cavi elettrici," Rendiconti dell'A.E.I. (Associazione Elettrotecnica Italiana) XXIX, No. 142, (Oct. 1954).—**End**

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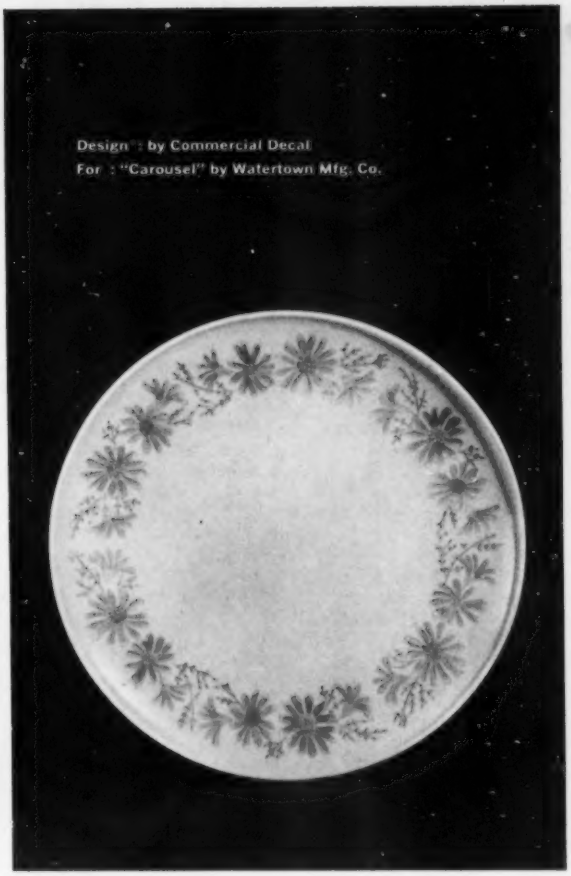

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COMMERCIAL DECAL

Plastics at the AMA Packaging Show

Plastics, through improved materials, techniques, and fabricating equipment, are now in a position to challenge the "big three" of packaging—paper, glass, and metal—on a variety of fronts. This is the important trend that was evident at the 28th AMA National Packaging Exposition held in Chicago, Ill., from April 13 to 17. Here are some highlights from the exhibits.

Films, coatings, laminates

These materials are steadily increasing their share of bags, pouches, overwraps, and related applications. According to a show prediction by Vincent M. McCarthy, manager of polyethylene sales for U. S. Industrial Chemicals Co., consumption of polyethylene film for packaging is expected to climb from its present rate of 200 million lb. per year to 400 million lb. by 1964. He also estimated that cast PE film could provide an outlet for 50 million lb. of PE by 1964, exclusive of the film used in overwrapping baked goods.

Eastman Chemical Products, Inc. demonstrated a machine that overwraps baked goods in paperboard boxes with film extruded from medium-density polyethylene at 100 packages per minute; another machine using film of low-density PE formed film pouches around soft goods at a 60-per-minute clip. Industrial bags made of heavy-gage PE film, displayed at several show exhibits, are gaining favor for 50- and 100-lb. shipments of molding resin, ammonium nitrate, hybrid corn, etc.

W. R. Grace & Co.'s Polymer Chemicals Div. exhibited one of the first commercial uses of Grex high-density PE film—frozen cheesecake produced by Columbia Ice and Ice Cream Co., Chicago. The 2-mil bag, it was stated, retains moisture at least three times more effectively than film of conventional PE. Significant new applications for polyester films included "boil in a bag" packages for precooked foods.

Thermoforming is big

Integrated installations in which disposable containers are thermoformed, filled and sealed in rapid sequence, are providing vast new markets for sheet stock. One machine dramatically illustrating present possibilities was the Hydro-Chemie Formseal, demonstrated in the Conapac Corp. booth. This compact unit automatically forms film or sheet into individual containers, filling, sealing, and trimming them in synchronized operations. It is suitable for automatic mass- packaging of solids, powders, pastes, and liquids into hermetically sealed containers. Maximum output of the machine, based on a 3.6-sec. forming cycle, is approximately 1000 cycles per hour.

A new concept in liquid packaging was demonstrated by Leedpak, Inc., whose Allpac machine automatically forms plastic bottles from roll stock of rigid vinyl or other thermoplastics. The machine will produce up to 6000 finished containers per hour, in sizes up to one quart. Basic principle of the equipment is to fold the moving web of sheet stock, thermoform the matching halves of the container in a continuous process, and weld them together for the finished package, which accepts a variety of internal or external screw closures, caps and plugs. Although new in the U. S., the machine has been successfully market tested in Europe.

Blister packaging now $6 million business

Thermoformed blister, bubble and skin packs have established themselves as almost the standard package for a host of hardware, household gadget, and toy and novelty items. Better equipment and plastic film and sheet stocks have brought these packages to a high degree of automation and cut costs to a new low for more competitive pricing. E. W. Ward, marketing director of Celanese Corp.'s Plastics Div., pointing out that blister packaging of common household items has expanded into a $6 million business, cited market studies indicating that volume may at least double by 1962.

Thermoplastics tubes are capturing new and important markets. A notable case in point: outboard motor grease, long packaged in collapsible metal tubes, is moving rapidly into king-sized polyethylene tubes which provide improved appearance, lighter weight, more convenient dispensing. Tubes and bottles, currently consuming 20 million lb. of PE annually, are expected to require 30 million lb. annually within five years. Among interesting new developments in this field were the non-porous "squeeze-to-use" polyvinyl tubes shown by Thatcher Glass Mfg. Co., Inc. They were described as especially suitable for hard-to-package products such as paint pigments, shampoos, machine grease and oil, baby oil, etc.

Featherweight, blow-molded containers of high-density polyethylene may soon challenge glass as the "workhorse" package for many types of liquid products, ranging from detergents to corrosive chemicals. Plax Corp. introduced a new 1-gal. container, molded of Phillips' Marlex material, which weighs only 1/15 as much as a comparable glass container. The Plax gallon uses 37% less warehouse and truck space than a round gallon jug. (See MPL, May 1959, p. 192, for details.)

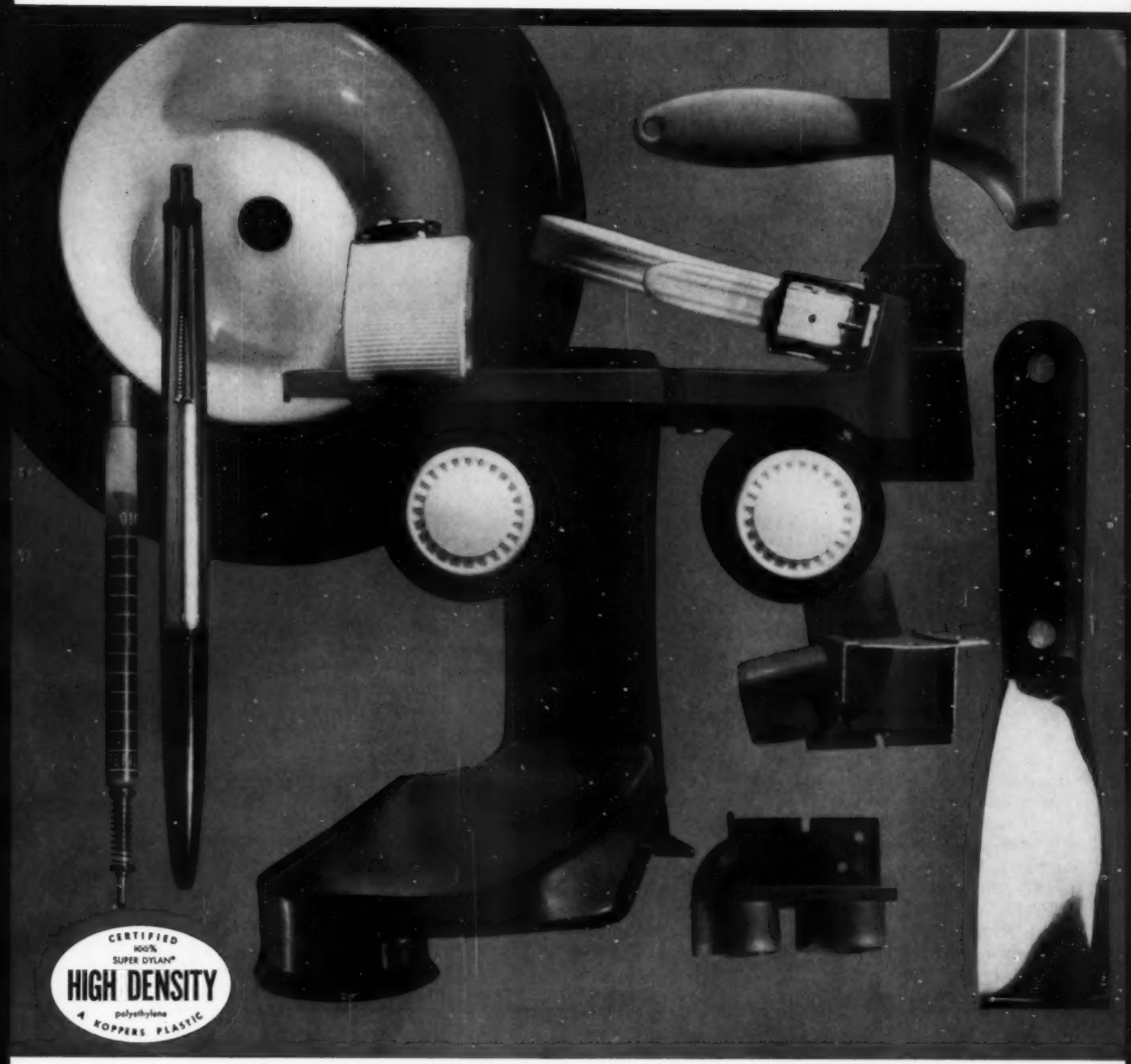
Transparent oriented styrene film and sheet stock, produced by Dow Chemical Co. and Plax Corp., is coming into its own after a long gestation period and appears headed for a major role in packaging. With improved thermoforming equipment now available, the rigid, low-cost sheet stock is being widely adopted for bubble packs and in tray-and-lid packages for frozen poultry, fish sticks, and a variety of other foods, including baked goods. The transparent foamed styrene covers are also used in conjunction with semi-rigid aluminum foil bases, permitting an effective crimped seal closure. On exhibit by Emhart Mfg. Co.'s Portland Div. was a three-head forming machine which automatically produces transparent or opaque lids for 8-, 12- and 16-oz. paper food containers, using either oriented styrene or other types of sheet plastics.

As a thin-gage, dimensionally stable film, oriented styrene is challenging long-established materials, including cellophane, as a wrap or window material for numerous food products, stationery, soft goods, and other items. Many products packaged in Dow's new Trycite styrene film were exhibited in the company's booth. Offering excellent printability and strength, resistance to food chemicals, and breathing qualities vital to the preservation of many food products, it is said to cost less than any comparable film.

Foam important replacement

Molded styrene foam is emerging as an important contender for numerous packaging assignments formerly dominated by non-plastic materials. Shock-resistant shipping containers for typewriters, cosmetics, ice cream and other food products illustrated how this lightweight, efficient insulating material can be molded into sturdy form-fitting packages which eliminate product damage, maintain low internal temperatures where required, and save the shipper money. Thin-gage, extruded sheets of expandable styrene foam, and tray-type packages thermoformed from them, aroused interest at the Koppers booth.

Re-use containers, injection molded of styrene, acetate and other thermoplastics, continue to win adherents when the packager wishes a durable "show case" for his product which affords continued use after removal of the product or provides storage for it after purchase. Food containers with tight-sealing lids, which double as flower pots, typified some of the imaginative thinking in this field.—**End**



SUPER DYLAN polyethylene
gets to the heart of tough design problems

Light-duty wheels—where a tough, rust-proof, light-weight, easily moldable material is needed—SUPER DYLAN.

Putty knife and paint brush handles—where a low cost, durable material, to which paint will not stick, is called for—SUPER DYLAN.

Auto heater and defroster outlet—where a material must remain dimensionally stable under heat without losing its strength or rigidity—SUPER DYLAN.

Scripto Pen cartridges— where outstanding environmental crack-resistance is a must; clear enough to see the ink supply —SUPER DYLAN.

Roller skates—where a moldable, colorful material with built-in self-lubricating properties to combat friction is called for —SUPER DYLAN.

If you're designing a product that demands a hard-working, chemically-resistant plastic that is strong, easily colored, possesses a glossy finish and is simply processed—SUPER DYLAN is your answer. For more information, write to Koppers Company, Inc., Plastics Division, Dept. MP692, Pittsburgh 19, Pa.

DYLITE *expandable polystyrene*, DYLENE *polystyrene and* DYLAN *polyethylene are other fine plastics produced by Koppers Company.*

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KOPPERS PLASTICS

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KOPPERS

THE PLASTISCOPE*

News and interpretations of the news

By R. L. Van Boskirk

Section 2 (*Section 1 starts on p. 37*) **June 1959**

Delrin to be on market soon

A plant that will produce more than a million lb. of Delrin a month will be in commercial production within the next month or so. The facility has been designed so that it may be expanded to take care of an anticipated increase in demand as soon as customers become more familiar with the material.

Du Pont, the producer, has supplied limited quantities from a small semi-works plant at Belle, W. Va. for the past three years. Almost 500 end-use evaluation programs were conducted with over 250 firms. The financial investment was even greater than that required for development of nylon 20 years ago. As a result of this program, it is expected that a good number of finished products will be ready for marketing just as soon as the molder or extruder can obtain Delrin in commercial quantities.

The first offering price will be 95¢/lb., which is about equal to the price of nylon since Delrin (specific gravity=1.425) is somewhat heavier than nylon. But since the starting point for Delrin is formaldehyde, a low-cost raw material, it is expected that cost will decline as consumption increases. Du Pont will give no predictions on the rate of decline in cost but an 80¢ price range within the foreseeable future seems logical; and a considerably lower price is an eventual possibility. However, it is extremely dangerous to predict price declines for any resin; and although an 80¢ price range seems reasonably certain after a normal "shakedown" period, a lower price than that must depend upon acceptance by the trade and development of competition with other materials.

Delrin is the registered trademark; acetal resin is the generic or descriptive term by which it is identified. But there is no similarity whatsoever between Delrin and the commonly known polyvinyl acetal resin. Delrin is known chemically as a polyoxymethylene.

The outstanding feature of Delrin is its combination of properties. It is extremely rigid without being brittle. It is both tough and resilient, much like spring steel. Perhaps its most unusual feature is that it retains these properties under adverse conditions of temperature and humidity, during an extended time under stress, and during exposure to most solvents. It is heavier than most plastics, but 45% lighter than aluminum and 20% lighter than magnesium. Heat distortion temperature at 264 p.s.i. is 212° F., melting point is 347° F. It can be used for parts operating for long periods at temperatures of 250° F., and has good chemical resistance. Its water absorption is almost nil, which is one of its outstanding differences when compared with nylon. It is in a class with graphite as a frictionless material, that is, it exhibits no "slip-stick." This property is particularly useful for moving parts of textile machines. Two compositions will be offered — "500" for general-purpose molding, and high-viscosity "150" for extrusion.

End-use evaluations have run the gamut from harpsichord picks to automobile instrument cluster housings. The first replaces crow quills — the second replaces zinc. Aerosol bottles were successfully subjected to pressures 13 times greater than those commonly used in metal containers. A speedometer gear shaft of Delrin ran against a steel worm gear for the equivalent of 100,000 miles at 110 m.p.h. with negligible wear.

The new material is described as a substance in middle-ground between plastics and metals. It is being pointed particularly as a replacement for metal — for example, refrigerator door handles. It is estimated that these handles could be supplied in Delrin at 20 to 25% below the price of chrome-plated zinc die-cast handles presently in use. In the case of auto instrument cluster housings, a reduction in weight of almost 80% indicates saving in shipping costs, in addition to eliminating the finishing operations required on die-cast parts. Since Delrin has good electrical properties, another cost-saving advantage may be possible through printing of electrical circuits directly on the rear of the housing.

Other uses are hardware items for windows and bathrooms, showerheads, knife handles, tableware, fountain pen barrels, pipe stems, clothes pins, complex toys, tumblers, football shoe cleats, portable drill housings, drawer handles, drapery slides, caster wheels, timing gears and cams for gasoline engines, cams for business machines, lawn mower roller bearings, movie projector impellers, bushings and bearings of numerous types, and door hinges.

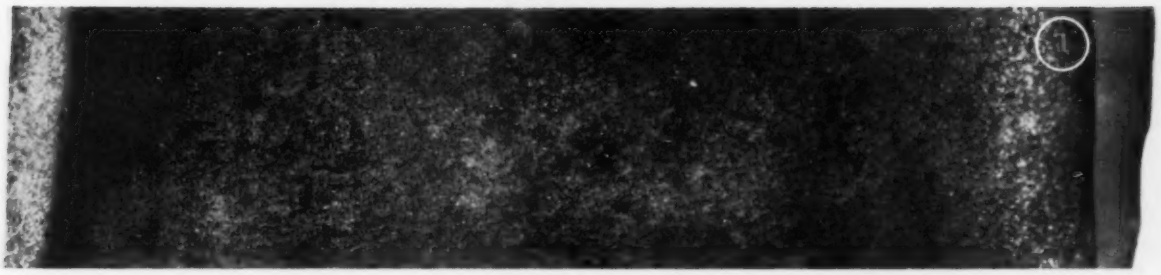
*Reg. U.S. Pat. Off.

Polystyrene colors

A "color requirement plan" which offers an assured price and delivery schedule for colored molding compounds, is being offered by Foster Grant Co. Inc. to those of its customers who will forecast their color requirements of polystyrene molding materials over a reasonable period and meet minimum quantity delivery standards. Under the "color requirement plan," prices are 23¢/lb. for general purpose colors (Fostarene) and 32½¢/lb. for high-impact colors (Tuf-Flex).

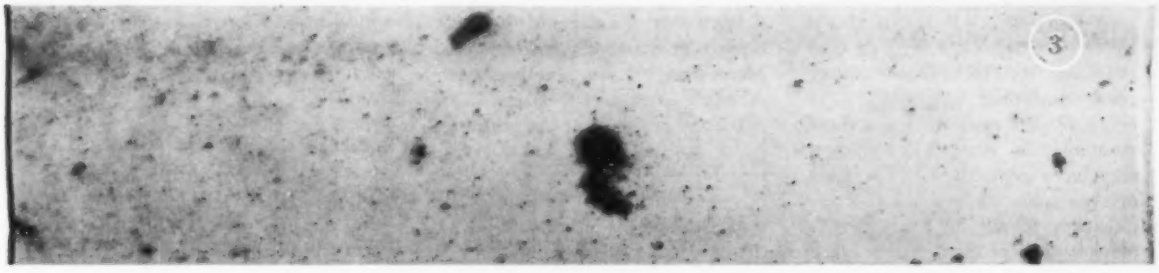
To qualify for the prices listed, the following is re- **(To page 218)**

Dirt pick-up test proves



superior migration resistance of

Eastman Polymeric Plasticizer NP-10



in vinyl compounds

1 / *Vinyl film containing polymeric plasticizer A*

2 / *Vinyl film containing polymeric plasticizer B*

3 / *Vinyl film containing Eastman Polymeric Plasticizer NP-10*

These three photographs show the results of exposing vinyl films to sun and weather for a period of six months.

The top two samples are plasticized with ordinary commercial polymeric plasticizers, the lower one with Eastman Polymeric Plasticizer NP-10

The two vinyl films containing Plasticizer A and Plasticizer B show excessive dirt pick-up resulting from migration of the plasticizer to the surface of the film. The vinyl sample containing NP-10 shows virtually no dirt pick-up.

Superior migration resistance is only one of the permanence characteristics contributed to vinyls by NP-10. Its loss from vinyl films to hydrocarbons, soapy water and activated charcoal is also extremely low. It is highly resistant to hydrolysis. Thus, vinyls containing NP-10 can be expected to retain their plasticity under the most severe conditions for long periods of time.

In spite of these outstanding permanence characteristics, NP-10 is not a high-molecular-weight material. Consequently, it blends easily and rapidly, permitting vinyl compounders to maintain efficient production schedules.

This combination...ease of processing with maximum permanence...makes NP-10 an ideal plasticizer for many vinyl applications. We invite you to investigate its performance in your own formulations. For samples of NP-10, write EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

The test: *Samples of vinyl film, each containing 50 parts of plasticizer per hundred parts of resin, were prepared using three different polymeric plasticizers. The test samples were exposed for six months on a weathering fence inclined at 45 degrees to the south. At the end of the test period, surface of film was observed for degree of dirt pick-up.*

SALES OFFICES:

Eastman Chemical Products, Inc.,
Kingsport, Tennessee; Atlanta; Chicago; Cincinnati; Cleveland; Detroit; Framingham, Mass.; Greensboro, N. C.; Houston; New York; St. Louis.

West Coast: Wilson Meyer Co.,
San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

THE PLASTISCOPE

(*From page 216*)

quired of the customer: 1) A written estimate of the customer's color requirements over a reasonable period of time. 2) The list of colors in this estimated schedule can include: a.) Foster Grant control colors (those manufactured regularly in large volume). b.) Colors specified by the customer. Specified colors should each be of a large volume or ones that have accumulated for volume production runs. 3) On or before the 15th of the month preceding delivery required by the customer, a firm order will be placed in accordance with the written estimate (includes control and specified colors) for shipment directly or to a warehouse in the ensuing month.

Highway hopes for epoxies

A nation-wide network of plastic formulators has been established by Shell Chemical Corp., to help promote its Guardkote epoxy road surfacing material. The company has made its know-how available to several companies who have experience in handling epoxy resins and who have application teams or are able to market this product to contractors or state highway departments.

Guardkote is a two-component system which can be mixed in equal amounts either by weight or volume. Since one is amber in color and the other black, compounding errors are virtually eliminated.

The company has developed special cost-saving equipment for mixing and applying the coating over large areas. It is estimated that a bridge one mile long, six lanes wide can be completed by this unit in one week. This equipment know-how is part of Shell's assistance to its formulators.

Main applications for epoxies as road surfacing materials are on bridges, at toll booths, sharp curves, and dangerous intersections, since these materials have a high degree of skid resistance; protect surfaces from freeze-thaw damage, de-icing salts, and gasoline; and seal off the surface so that water will not penetrate. Resurfacing on bridges is thought to be a particularly suitable application, because epoxies have a lighter dead-weight factor, and old bridges cannot always support thicker, heavier layers of conventional resurfacing materials. This advantage may also provide savings in construction costs of new bridges.

Must for molders

An important event for plastics molders who want to see what's going on in a highly representative section of the plastics molding industry is the National Housewares Exhibit in Atlantic City, N. J., July 13-17. Visitors at this exhibit will be able to see and compare in five days more housewares than could be discussed in their offices in a year. More than 700 manufacturers are scheduled to exhibit at the show. Advance registration cards have been mailed to 13,000 buyers, merchandise managers, and other buying personnel. Information may be obtained from the National Housewares Mfrs. Assn., 1130 Merchandise Mart, Chicago 54, Ill.

Drafting film

A new drafting film for the engineering and architectural field has been announced by Du Pont Photo Products Dept., Wilmington, Del.

The film is a companion product to Du Pont's photo-sensitive Cronaflex engineering reproduction films, and is available with either one or two sides matte-finished for ready acceptance of pencil and ink. Repeated erasures can be made without detrimental effect upon the matte surface and without leaving ghost images. Title-block printing, with fast-drying inks, may be used on either matte or non-matte sides.

Cronaflex drafting film has a 0.004-in. Du Pont polyester photographic film base which has one-third the tensile strength of steel and is said to be virtually tear-proof.

According to Du Pont, the new drafting medium may be creased without damage to the matte surface, and is virtually unaffected by moisture. The 0.004-in. thickness provides adequate body and substance for easy handling.

At the Milan Fair

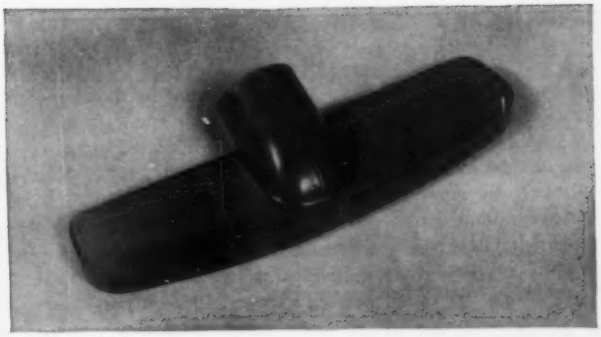
Various stereospecific polymers were the center of interest at the recently held trade fair in Milan, Italy. Special attention was focussed on a large range of molded polypropylene products featured at the Montecatini exhibit and in those of several molders. Copolymers of ethylene and propylene, mainly developed for elastomers, were shown by Montecatini as experimental tires and also in various colors.

New films were discussed in technical papers, and Dr. Aldo Camerini of Polymer Co. announced that Montecatini has developed the machinery for bi-orienting polypropylene films for greatest strength. The bi-oriented isotactic films, he said, can be obtained with a minimum thickness of 6 to 8 microns. The material's low specific gravity further improves its competitive advantages, Dr. Camerini pointed out.

In another paper, Dr. Giulio Natta alluded in passing to a new film modification of isotactic polypropylene, obtained through rapid cooling. This new variation is said to exhibit unusual transparency and gloss, and will be made available in densities ranging from 0.860 to 0.880, compared with 0.900 to 0.910 for ordinary isotactic polypropylene.

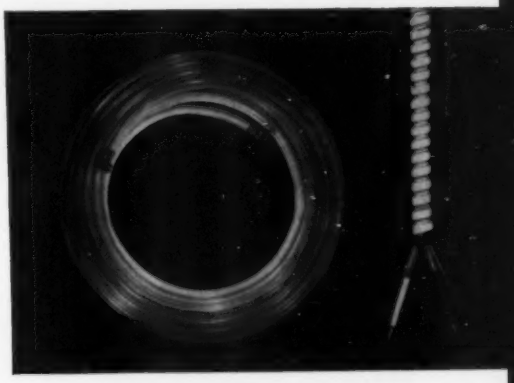
Non-oriented film, Dr. Camerini said, would find application for packaging materials where appearance, mechanical properties, and workability on automatic machines are factors. Heat-sealing of these polypropylene films can be accomplished at temperatures ranging from 170 to 210° C., he stated. Non-oriented polypropylene films show excellent printability with the same inks as those used for PE.

Oriented films can be obtained 6 microns thick and up. One pound of polypropylene film will give about 7000-sq. **(To page 220)**



OPALON*

for every possible type of vinyl application



A wide range of OPALON VINYL resins and compounds have been perfected by Monsanto to meet the specific needs of molders of appliance parts, housings, toys, phonograph records, rain-wear . . . extruders of wire and cable insulation, garden hose . . . calenderers and extruders of vinyl film and sheeting . . . manufacturers of floor tile . . . coaters of textile and paper for upholstery and wall coverings . . . and compounders of plastisols for metal coating, slush-molding, foaming, and dipping. Specify OPALON vinyl—and profit from Monsanto research, experience, and productive capacity. Monsanto Chemical Company, Plastics Division, Springfield 2, Massachusetts.

Monsanto

*OPALON: REG. U.S. PAT. OFF.

THE PLASTISCOPE

(*From page 218*)

in. of sheet, 10 microns thick. The oriented film can be heat-sealed, but orientation is lost in the seal zone. This film can also be metallized, and laminations with paper, aluminum foil or cellophane can easily be accomplished. Polypropylene films ½ to 1 millimeter thick have been produced by Montecatini as a material for vacuum forming.

Glass reinforced film

Polyethylene film reinforced with fibrous glass, and reported to have extraordinary strength and long life, has been announced by Gering Products, Inc., Kenilworth, N. J. The new film will not stretch or bag and resists rips and tears. A small puncture stays small, because the reinforcing fibers prevent it from spreading.

This film, designated Ger-Pak, is suggested for hay covers, equipment covers, closing-in during construction, storm windows, silos, hen house glazing, and cold frames.

Ger-Pak reinforced film is supplied in 2 by 2 mesh (2 squares per inch) and 4 by 4 mesh (4 squares per inch) in 4 and 8 mil thickness in 100 ft. and 150 ft. length rolls. All sizes are offered in natural (clear) or black (sunlight resistant).

New firm to arrange licensing agreements

A new agency which will make a business of seeking out American firms who wish to license European manufacturers of plastics materials and processes has been set up at 2808 N. Harrison St., Wilmington 2, Del., by L. T. "Doc" Barnette, formerly of Hercules Powder Co.

Mr. Barnette points out that the organization of the European Common Market will surely increase the present difficulties involved in exporting finished plastics articles from the United States, but, at the same time, will increase the ultimate potential for European manufacturers. It will, therefore, become essential for the U. S. inventor to license companies within that market in order to profit from his developments and the new agency's aim is to bring the interested parties together for negotiations.

For rigid urethane foam

Essentially closed-cell rigid urethane foams can be produced by mixing Pleogen 4002—a polyester developed by Mol-Rez Div., American Petrochemical Corp., Minneapolis, Minn.—with a suitable polyisocyanate and a blowing agent.

The company recommends Allied Chemical Co.'s Nacconate 1080-H, as the isocyanate for conventionally blown foams as well as for formulations using fluorinated hydrocarbons as blowing agents.

Prices of this general purpose foam resin, already compounded with catalyst and surfactant, range from $0.84/lb. in 5-gal. quantities to $0.725/lb. in 40 drum lots.

Mylar for greenhouses

Weatherable Mylar polyester film as a greenhouse covering now lasts longer and costs less, says Du Pont's Film Dept., and has a minimum useful life outdoors of four to seven years, instead of the three to five previously promised.

The price of the greenhouse-glazing grade has been lowered by 15%—a reduction made possible by the development of a new type of film for use when only one side will be exposed to the weather.

Du Pont estimates that with the new film a greenhouse can be erected for about 65% less than the cost of a glass structure.

Urea for particle board

A self-curing liquid urea-formaldehyde thermosetting resin for bonding particle board has been developed by Borden Chemical Co. Designated Auto-Set 31, the resin is especially designed for use with multi-platen presses.

According to the company, the new resin eliminates the necessity of catalyst mixing, makes possible 25% greater internal bonds, and reduces press cycle time up to 20 percent.

Plastics for automotive uses

A one-day technical meeting on plastics in automotive uses will be held at the Sheraton-Cadillac Hotel, Detroit, Mich., on June 30, 1959. Some of the subjects to be covered: "Cost advantages of plastics in replacement of die castings;" "Linear polyethylene molding of the seat side shield for the 1960 Ford;" "The growth of plastics in European cars;" "The difference in the domestic and foreign outlook on the use of plastics in automobiles;" "Blow molding with high density polyethylene."

For advance registration, contact Brandt Nelson, Celanese Corp. of America, 2842 W. Grand Blvd., Detroit 2, Mich.

New curing resin

A bromo-methyl alkylated phenol-formaldehyde resin which reduces the cure time of butyl rubber and is said to provide it with improved heat resistance and compression set properties has been developed by Schenectady Varnish Co., Inc., Schenectady, N. Y.

Designated SP-1055, it overcomes a major economic obstacle to the more widespread use of butyl rubber by making possible 10- to 60-min. curing cycles at temperatures of 300 to 350° F.

The resin also makes possible parts for service up to 500° F., in contrast to natural, SBR (GR-S), or other synthetic rubbers, which harden or soften after short periods of exposure to temperatures above 300° F.

PE dispersion coating

A sprayable high-density polyethylene coating is now being made available in semi-commercial quantities by the Plastics Div. of Koppers Co., Inc. The coatings are said to possess excellent continuity (freedom from pinholes), and to have outstanding adhesion qualities on a variety of surfaces, including metal and glass. It may be applied at room temperature by various conventional coating methods, and the coated **(To page 222)**

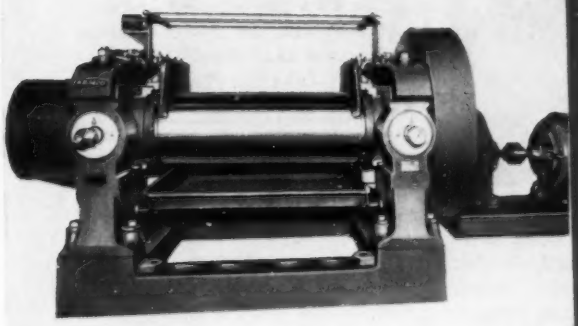
Consult ERIE ENGINE & MFG. CO.

for prices and delivery

MILLS • •

for the RUBBER and PLASTICS INDUSTRIES

EEMCO mills for mixing and compounding rubber and plastics are available in all sizes from laboratory mills up to and including 84″ mills in standard or custom units.



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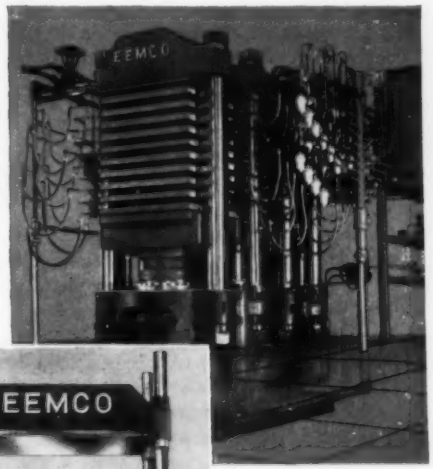
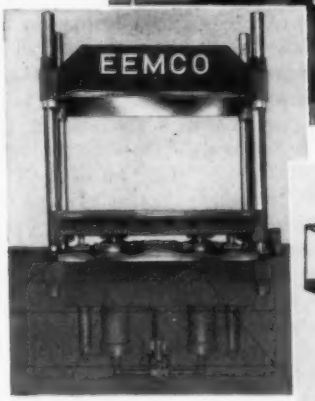
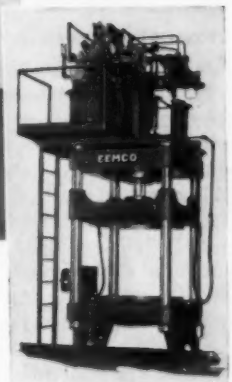
REINFORCED PLASTICS MOLDING

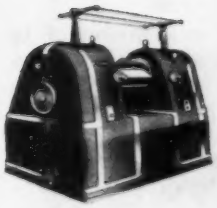
EEMCO heavy duty hydraulic presses are also available in a complete range of sizes from the 12″ x 12″ 42 ton laboratory press up to any size required. EEMCO designs and builds special presses to meet the customer's requirements.







EEMCO furnishes complete installations for reinforced plastics molding—presses, hydraulic units, preform machines, roving cutters and ovens.



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THE PLASTISCOPE

(*From page 220*)

part is subsequently heated to about 400° F. to fuse the coating and bond it to the surface.

Suggested uses include industrial process equipment, tanks, drums, pipe coatings, automotive parts, appliances, marine equipment, food and beverage can linings, and electrical insulation.

Clear vinyl insulation

A transparent, fungus-resistant vinyl insulation sleeving has been developed by the Borden Chemical Co.'s Resinite Dept. The material has been designated as Resinite EP-69C, and conforms to the requirements of Navy Specification MIL-I-631C, Grades *a* and *b*, for electrical insulation in the automotive industry.

Unlike former materials of this type, which embodied amber color as part of their resistance to fungus, the new Borden product is made of a clear vinyl which makes it easy to determine colors, markings, and other system identifications of the wiring carried within the sleeving.

In addition to its new fungicidal properties, the physical characteristics of Resinite EP-69C have been improved over similar former insulation. It has a low-temperature flexibility to —75°F., high-temperature stability to 185° F., and dielectric strength to 900 v. per mil of wall thickness, the company states. The material also is self extinguishing in 6 seconds.

Ultraviolet absorber

Markets for polyethylene and polypropylene products for outdoor use may increase as the result of the development of a new ultraviolet light-absorbing chemical by American Cyanamid Co.

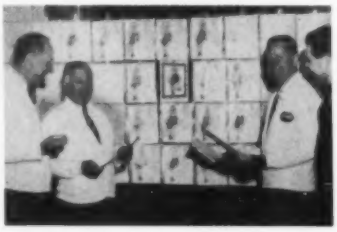
This new UV absorber is expected to increase annual PE consumption by as much as 50%, according to Dr. J. A. Weicksel, product supervisor for Cyanamid's line of Cyasorb UV absorbers. A similar impact on the polypropylene market is anticipated by the company.

Known as UV 314, the new absorber is expected to be available commercially early next year. Present studies indicate a probable sales price of $7 to $10/lb. for the commercial product.

According to Cyanamid, this chemical will be used initially in PE fibers, film and sheeting.

Judges at work

In photo below (left to right), William T. Cruse, executive vice president, The Society of the Plastics Industry, Inc.; Charles A. Breskin, chairman of the board, Breskin Publications; Stan Ekman, Chicago artist; and Ray Bailey, field sales manager, Spencer Chemical Co., rack their brains to decide on the best cray-



ola coloring job. The group convened in Chicago recently to pick a winner in Spencer Chemical Co.'s "Poly-Pro" coloring contest, a feature in Spencer's introduction of a trademark for their new polypropylene. "Poly-Pro" polypropylene is scheduled to be available in commercial quantities by January, 1960.

Incidentally, the three judges (Bailey was merely on hand in the role of a host) couldn't arrive at a clear-cut decision on the first prize winner. They awarded first prize bicycles to Arlene Marano, age 9, of Springfield, N. J., and Susan Valenti, 8, Astoria, N. Y.

Liner for PE squeeze tube

A new coating for polyethylene, developed in American Can Company's research laboratories, will permit packaging of toothpaste in "squeeze" tubes for the first time, the company reports.

When applied to the tube's inner wall, the coating or lining forms an excellent barrier to permeation by odor, flavor, solvents, oxygen, oil, and grease, and also would protect polyethylene against attack by formulations which would otherwise cause it to swell or degrade.

Polyethylene tubes are widely used for many cosmetics, pharmaceuticals, and household and industrial products, but lack of an effective means of preventing sidewall permeation has made them unsuitable for some other products, including dentifrices.

The company has set up pilot production units in its Maynard, Mass., plant, for applying the coating by a newly developed technique.

Urethane industrial enamel

A water emulsion urethane coating has been developed by Mobay Chemical Co., and promises to become a strong challenger in the industrial enamel market.

This coating results from a reaction of a specially blocked isocyanate with an amine-bearing resin, such as General Mills' Versamid polyamide. The resulting polymer is composed of substituted urea linkages rather than the more familiar urethane linkage.

Mobay's system is a one-package, bake-type coating which can be made up either as a water emulsion or a standard solvent system. Its main significance is that it can be used either as a primer system or a one-coat enamel for metal finishing.

(For a fuller discussion of the current status of urethane coatings see "The urethanes grow up —Part 3," starting on page 101 of this issue.)

Glass-filled resins

A reduction ranging from 1 to 1½¢/lb. for their glass reinforced polystyrenes represents a new all-time low in the cost per cubic inch to injection molders of these tough, high-strength compounds, according to Fiberfil, Inc., Warsaw, Ind.

William H. Chadbourne, VP and gen. mgr., has also announced substantial boosts in Fiberfil's production during the past six months. Mr. Chadbourne said that the Warsaw plant has actually doubled its output **(To page 224)**

Can it be sleeping that's making you tired?

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THE PLASTISCOPE

(From page 222)

of Fiberfil G-31 Polystyrene, an extra-high-impact grade. "With its tensile strength of 14,000 p.s.i. and its impact strength of 4.25 ft./lb./in. of notch," Mr. Chadbourne reported, "this grade measures up mechanically to the more expensive plastics."

Fiberfil, Inc. further reported that the standard rigid Fiberfil G-1 glass-reinforced nylon is now offered in two modified grades: (HR) hydrolysis-resistant and (EM) which provides easier molding and better filling qualities.

Guaranteed vinyl hose

Garden hose reinforced with nylon tire cord, and said to have unusual strength and durability is now offered by Gering Products, Inc., with a guarantee that it will not burst under the highest water pressure in any area. It will not burst under pressure even when shut off at the nozzle, the company states. The new product has been tested for eight successive hours at 180 p.s.i. at 100° F.

Glass-melamine laminate

Excellent fire and arc resistance under damp or even wet conditions, is claimed for a new glass-melamine laminated material announced by Formica Corp., Cincinnati, Ohio, subsidiary of American Cyanamid Co.

According to the company, the new laminate will retain 70% of its dielectric strength after 336 hr. immersion in water at 50° C. and 50% after exposure for 1000 hr. under the same conditions. This compares with a 90% loss in 48 hr., common to melamine laminates sold under the designation of NEMA G-5.

Thatcher buys Plastic Tube & Bottle, Inc.

A Plastic Container Div. has been announced by Thatcher Glass Mfg. Co., Inc., as an outgrowth of the purchase of Plastic Tube & Bottle, Inc., Nashua, N. H.

Thatcher also recently announced the purchase of the assets and business of The Celon Co., Muscatine, Iowa, manufacturer of cellulose bands used as secondary seals for glass containers, and makers of a line of plastics closures.

In addition to polyethylene squeeze-tubes and bottles, the new division is also introducing "polyvinyl" squeeze-tubes, which will be in production soon, for products such as print pigments, petroleum jellies, greases, and shampoos.

Plastic Tube & Bottle, Inc., and Plastic Tube & Bottle Distributors, Inc., were originally formed by Henry E. Griffith, who has been elected Vice President of Thatcher's new Plastic Container Division.

Japanese export goals

An increase of 66% in the amount of Japanese exports of plastics resins and plastics products, has been announced as that industry's goal for the fiscal year 1959.

According to Japanese sources, plastics export in 1958 amounted to about 49.8 million lb., an increase of 2.8% over the 1957 volume. The target for 1959 is 82.2 million lb. of resins and products. These shipments in 1958 are reported to have amounted to $10.8 million, and the anticipated 1959 volume is expected to reach nearly $18 million.

The table below breaks down polyvinyl chloride exports by resins and products.

Also, in the second half of 1959, Japanese exports of plastics to the Chinese mainland are expected to reach 3.5 million lb., of which 2.6 million lb. are PVC resins. During the first half of this year, exports to Red China were negligible.

Polyester for embedment

A crystal clear polyester base casting resin which cures at room temperature is now supplied by Cadillac Plastic & Chemical Co., Detroit, Mich. The new Cadco resin may be used for casting of small parts or prototypes and for embedment of product displays, documents, scientific specimens and souvenirs.

The special formulation is said to have excellent optical properties and hardens in 45 min. at room temperature and in 25 min. at 150° F.

Castings and embedments of this resin are said to be shatter-resistant, do not soften with heat, and may be exposed intermittently to 350° F.

Resin for records

United States Rubber Co. has followed several other vinyl chloride producers in development of a vinyl chloride-acetate copolymer for phonograph records. Phonograph records made from vinyl resin give high fidelity reproduction with unusually low background noise level.

The new material, called Marvinol VR-60, is described by researchers as "soft." **(To page 226)**

Japanese exports

PVC	1958 Metric tons in thousands	1958 U. S. $ in thousands	1959 Metric tons in thousands	1959 U. S. $ in thousands
Resin	14.85	5047.0	25.00	7877.5
Film	1.94	1183.0	25.00*	7877.5*
Sheet	1.72	1034.2	2.60	1935.0
Supported sheet	1.18	1108.7	1.80	1602.0
Extruded products	0.10	47.1	0.15	82.5
Rigid pipe	0.05	20.9	0.55	385.0
Rigid plate	0.04	34.8	0.10	140.0
Other PVC products	0.41	415.7	0.62	620.0
Total PVC resins and products	20.29	8891.4	55.82	20519.5

*The 1959 estimates for film are shown as given by Japanese sources, but seem to be incorrect.

for year-around action--

ADVERTISE IN
MODERN PLASTICS
ENCYCLOPEDIA ISSUE

WHAT IT IS

The Modern Plastics Encyclopedia Issue is published annually in September as the thirteenth issue of Modern Plastics magazine . . . and goes to all Modern Plastics subscribers. It's the accepted "workbook" of the plastics field . . . carries the advertising of all the field's leading suppliers . . . answers practically all questions relating to plastics: materials and their properties, their applications, production methods, processing equipment and machinery . . . contains the only complete Buyers' Directory in the field . . . is completely revised each year to cover all new developments and changes.

Because of its "workbook" nature it's used by plastics men *year-round* to find quick, accurate solutions to production and procurement problems.

The current, 1,218-page edition includes 566 pages of advertising placed by almost every major supplier to the plastics field.

WHO READS IT?

The new edition will have the same circulation as Modern Plastics magazine. Currently the figure stands at more than 30,000—an all time high. This all-paid circulation covers the two basic areas of the market:

1. The "end-users" of plastics. Fully half of the Encyclopedia's total audience are manufacturers in other industries (*not* the plastics industry) who use plastics and plastics parts in large volume. Many of them operate their own plastics-working facilities; others "farm out" their plastics converting operations to contract services; and many of them employ both methods.

2. The plastics industry itself. The Encyclopedia literally "blankets" the industry; the contract converters of plastics materials (molders, extruders, fabricators, etc.); the mold and die makers; the makers of resins and molding compounds; the makers of film, sheeting and laminates.

WHAT DO THESE READERS BUY?

A glance through this issue of the magazine will give you a fairly good cross-section of the kinds of materials, supplies, services and equipment that users of plastics buy. Basic purchases include all of the following:

Chemical and Materials

adhesives • organsols • coatings • solvents • extenders • colorants • plastisols • plasticizers • stabilizers • laminates • dyes • saturating papers • glass fibre • wetting agents • synthetic resins • mold steels • fillers • lubricants

Equipment

hydraulic systems • scales • granulators • drills • buffers & polishers • extruders • mixers • drill presses • pyrometers • accumulators • cutting tools • heat sealers • lathes • mills • grinders • embossers • molding presses • timers • calenders • duplicators • slitters • control instruments • hobbing presses • motors • ovens • heating elements.

Services

deep drawing • assembling • postforming • hobbing • fabricating • plating • embossing • molding • decorating • laminating • mold making.

WHAT KIND OF AD WORKS BEST?

Readers of Modern Plastics Encyclopedia Issue want detailed, usable facts, not broad claims or fancy artwork. When they turn to the Encyclopedia Issue, they're getting down to "brass tacks"—comparing, evaluating, making buying selections.

Here are characteristic reader comments as reported by a leading research firm:

". . . need more technical data"

". . . give an idea of price range"

". . . more data on actual applications"

". . . give more complete physical and chemical properties"

". . . be specific in performance of machinery"

". . . too many ads have incomplete data"

". . . advertising is too general"

NEXT EDITION BEING READIED NOW

It's time now to reserve the advertising space you'll need in the next edition. The final deadline for advertising matter itself—June 20th—is not too far off, especially in view of the careful planning and preparation that your "tell-all" advertisement should be given in order to make it of greatest value to readers.

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* Lower rates apply to regular advertisers in Modern Plastics magazine. Ask for details.

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THE PLASTISCOPE

(*From page 224*)

This softness permits exacting reproductions of the metal master and is said to ensure a minimum of rejects due to molding flaws.

British bids for vinyl markets

A concentrated effort to sell more British vinyl sheeting in this country is being made by an organization called The Plasticmakers of England. This is a group of eight leading independent British manufacturers of vinyl materials, who have banded together in a marketing organization. Their products are stocked and distributed in this country by Strauss International Corp., 891 Longfellow Ave., New York 59, N. Y.

Among the vinyl goods imported from Britain are thick, suede-backed sheets; heavy-gage calf leather grains; hand finished and hand polished reptile grains, with calculated irregularities to make them almost indistinguishable from genuine skins; a combination of vinyl and fibrous glass, which will be marketed in this country in October as a very strong heat-sealable material for luggage, outdoor furniture, industrial applications, etc.; a cloth-like rainwear material; lightweight vinyl film reinforced with polyester fiber; and a large variety of patterned materials.

Prices for all the imported materials are competitive with U. S. products.

Polyester tapes

Metallized polyester film tapes, in four colors with pressure-sensitive adhesive backing and especially suited for decorative purposes, have been announced by Minnesota Mining & Mfg. Co.

The new colored tapes are an addition to the No. 850 line of polyester tapes, which includes transparent, silver, and gold colors.

Polystyrene panels for construction

A development plant to mass-produce a new type of sandwich panel for residential construction has been announced by the Plastics Div. of Koppers Co., Inc. The company expects to lease about 133,000 sq. ft. of space in the former Hudson motor car plant, Detroit, Mich., and will equip it initially to make panels with an expandable polystyrene core for approximately 1500 homes annually.

Until the Detroit plant is in operation, Koppers will continue to make a limited number of the panels for experimental use in its development laboratory at Kobuta, Pa. (See "Building time cut from week to one day," MPL, Mar. 1959, p. 100.)

$2 billion for structural plastics

Structural plastics could achieve an annual sales level of $2 billion by 1966, said Maurice F. Crass Jr., in a recent talk before the N. Y. Society of Security Analysts at the N. Y. Chamber of Commerce. "This is equivalent to the entire plastic industry's total sales last year, and an indication of how close we are to the plastic age in architecture."

Thermoset styrene copolymer

A low-loss, high-frequency dielectric for prototype work, called Rexolite, manufactured by Rex Corp., West Acton, Mass., is said to have outstanding machinability, coupled with hardness and high mechanical strength. These properties make the material useful for the construction of complex component miniaturization. This rigid thermosetting cross-linked styrene copolymer is available in rod and sheet form.

Polypropylene fiber in Italy

At the end of this year, commercial production of polypropylene textile fibers will be started in Italy by Polymer Co. of Italy, an associated firm of Montecatini. The new textile fibers have unusually high heat resistance, extremely light weight, and high strength. Its unusually low specific gravity (0.91), promises greater yields per unit weight of fiber, compared to currently available synthetic fibers.

Initial price for the staple on the Italian market will be about 60¢/lb.

Non-staining vinyl sheeting

Development of a new non-staining finish for its Colovin laminate-quality vinyl sheeting has been announced by Columbus Coated Fabrics Corp., Columbus, Ohio. This sheeting can be laminated to steel, aluminum, and other metals.

According to the company, all stains tested have proven removable from the new Colovin finish, including black hair dye, red hair dye, ball-point pen ink, iodine, and gentian violet.

Although the new formulation was developed primarily for use with white Colovin vinyl, it is also available in any other color, multi-colored combinations, and textured effects.

It is expected that the development of this new finish will be of a particular significance to the appliance industry.

To make polypropylene in Britain

License agreements for the industrial exploitation in the United Kingdom by Imperial Chemical Industries and Shell Chemical Co. of the Montecatini and Montecatini-Ziegler patents covering the production of polypropylene for plastic uses have been completed. Both licensees have announced that plant construction will begin immediately.

Pyroxylin book covers

Stocking and sampling of 120 colors of pyroxylin impregnated book cloths in four standard widths has been announced by The Columbia Mills, Inc. This new color line will be offered to book publishers and binderies, and is expected to contribute to the present record levels of book cloth production at the company's Minetto, N. Y., plant.

Toner colors for polyesters

Fluid toner colors for polyester resins are being introduced in 10 shades by the Sherwin-Williams Co. They are **(To page 228)**

BALLS UNLIMITED

FOR UNLIMITED APPLICATIONS

IN FIELDS UNLIMITED

ACRYLICS, CELLULOSICS, POLYSTYRENE, POLYETHYLENE, NYLONS, TEFLON®, LEXAN®, WOOD, STYROFOAM®.

NON METALLIC BALLS are used for a great variety of things such as check valves, ball bearings, rollers, detents, etc., as well as many uses in the chemical field. If you have a need, we are equipped to make balls from 1/16" dia. up to 1" dia. in quantity. Samples of many sizes in a range of materials are available.

We can also supply small turnings of cylindrical shapes formed from round rods and tubes for all types of applications. Range of sizes is from ⅛" to 1" diameter and up to 7" long. We hold tolerances of .002 on plastic and .005 on wood, plus or minus.

We make balls for all Roll-on Applicators. If a non-metallic ball is the answer to your problem, we are at your service.

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Perforating

—on all types of flexible materials, rigid sheets, and foam.

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in sheets and rolls up to 72" wide

Whatever your perforating needs, PERFORATING INDUSTRIES has the specialized equipment and know-how to handle the job. Rely on us if you're looking for quality workmanship, prompt delivery, and fair pricing.

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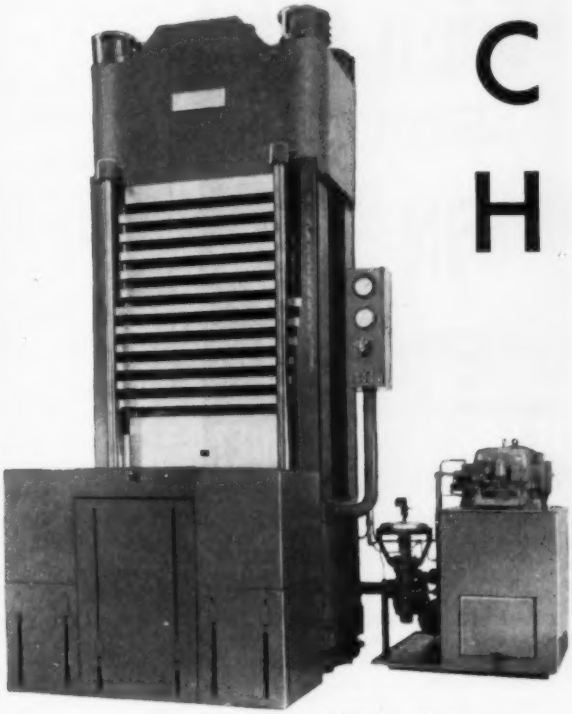

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Here it is! BOMB-LUBE, the remarkable mold release that amazes even experts who said it couldn't be done! **GIVES YOU TWICE AS MUCH AS ANY OTHER RELEASE, AT ANY PRICE.** It's an exclusive formula with **PLUS X** that prevents sticking, eliminates residues, reduces flow friction. Non-toxic, non-explosive, non-inflammable. 20 Oz. can provides hundreds of applications, less than 1¢ each. Send now for your **FREE** 20 OZ. SAMPLE . . . they said it couldn't be done . . . but we've done it, and how!

$2.50 single can, 12 to 47 cans, ea. **$1.90.** 48 or more cans **$1.75** ea. F.O.B. plant.

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Rockville Centre, N. Y.
Send me FREE 20 OZ. SAMPLE OF BOMB-LUBE.

Name_____

Address_____

City_____ Zone____ State____

THE PLASTISCOPE

(*From page 226*)

primary color bases dispersed in a reactive monomer, and easily poured into a resin mix.

The amount of toner color required is determined by the type of resin mix used. Unfilled laminates require 0.1% to 0.5% of color; formulations containing fillers may require from 1% to 10 percent.

The colors are offered in quart, gallon and 5-gal. containers, and may also be obtained in pre-packaged measured amounts to eliminate weighing operations.

New companies

Marjo Plastics Corp. will manufacture plastics shoe heels in San Juan, Puerto Rico. **Benjamin Slosberg,** associated with **Missouri Wood Heel Co.,** St. Louis, Mo., formed the new company.

Sterling Extruder Corp., Linden, N.J., is a new manufacturer of extruders from 1½-in. through 6-in. bore in the following L/D ratios: 15:1, 21:1, 24:1, 30:1. The company also manufactures auxiliary equipment for extrusion purposes. **L. D. Yokana** is pres.

ESB-Reeves Corp., jointly owned by **The Electric Storage Battery Co.,** and **Reeves Brothers, Inc.,** was formed to develop porous and microporous plastics materials suitable for wearing apparel and other end uses. Existing facilities of both parent companies will be used to initiate manufacture of the new products.

Expanded Corp., Wauregan, Conn., will manufacture expanded, extruded, and molded polystyrene products, in a portion of Wauregan Mills. Initially about 20 persons will be employed, growing to 60 or 70 within about six months. **Hugh R. Graham** is president and treasurer.

Expansion

Union Carbide Corp. plans to double polyethylene production capacity in the British Isles. Existing facilities at Grangemouth, Scotland, which are operated by **Union Carbide Ltd.,** will be augmented by another 30 million lb. per year unit, which is expected to be in production sometime in 1960.

This expansion represents the sixth major investment by Union Carbide in the European petrochemicals fields. Union Carbide Ltd. is also constructing an ethylene oxide and derivatives plant at Fawley, England, which is expected to be in operation in the last quarter of this year.

S.p.A. Celene is constructing a plant to produce ethylene oxide and derivatives in Italy. Celene is a jointly owned Italian company formed by Union Carbide Corp. and **Societa Edison,** Milan, to produce chemicals and plastics.

The new installation will be adjacent to Celene's PE unit near Prioli, Sicily. Plans call for annual capacity of 26.5 million pounds. Production is scheduled to commence in mid-1960.

Union Carbide Chemicals Co. doubled its capacity to produce polyether polyols at its S. Charleston, W. Va., plant. During the past year, the company introduced eight polyethers, designated Niax, for the manufacture of urethane foams.

Eureka Specialty Printing Co., Scranton, Pa., has purchased **Mark Andy, Inc.,** St. Louis, Mo., a manufacturer of pressure-sensitive labels and tapes.

Cutter Laboratories, Berkeley, Calif., has acquired all the assets of **Olympic Plastics Co., Inc.,** Los Angeles, Calif. Olympic produces plastic containers, squeeze bottles, and rigid blown containers for the drug, food, and cosmetics industries.

Cutter plans to increase plant capacity, and a new building will be started soon on the present site; new equipment for existing departments is on order.

Present management, staff, and operating personnel of Olympic will remain unchanged.

Food Machinery and Chemical Corp., Chemical Div., has started construction of a new wing at its Central Chemical **(To page 230)**

VINYL

YARDSTICK FOR 1959

STABILIZER 6-V-2

IN ALL FORMULATIONS FOR CALENDERING • EXTRUDING • MOLDING

Introduces New Controls in an Inexpensive Liquid Stabilizer

For the first time
performance variations due to resin or plasticizer or filler are minimized...

For the first time
storage problems due to exposure of stabilizer or compound to oxidation or moisture are eliminated... with STABILIZER 6-V-2

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VINYL STABILIZER 6-V-2
Highest mileage in heat and light stabilization plus the new regulating effects are yours at no extra cost

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Nacromer makes any plastic look better . . . sell better. It is the difference between products that are "eye-catchers" and "dust-catchers"... the difference between products that "move" off the shelf and those that just sit there. It is that important added feature that sets your product apart from competition.

Nacromer is no cure-it-all, but, it does have the power to improve the visual impact of plastics. Here are a few examples:

- The dull, waxy appearance of polyethylene is replaced with a bright lustre when Nacromer is incorporated into the plastic.
- Coated on smooth and embossed vinyl sheeting, Nacromer adds a brilliant, eye-catching sparkle.
- In polystyrene, Nacromer creates a jewel-like lustre.

Whether you incorporate Nacromer directly into thermoplastics or use it as a coating on any plastic, you can be sure it will add attractive, sales-compelling beauty. And, the few extra pennies you spend will more than pay.

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Please send information about Nacromer
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THE PLASTISCOPE

(*From page 228*)

Research Laboratory at Princeton, N. J., which will add more than 50% to the laboratory floor space. The new section will cost around $1 million.

The recently formed Inorganic Chemicals Research and Development Dept., under the direction of **Dr. Hans O. Kauffmann,** will occupy most of the new facility, using it to increase product application and sales-service activities. Dr. Kauffmann's group includes the research staffs formerly associated with **Becco Chemical Div., Westvaco Chlor-Alkali Div.,** and **Westvaco Mineral Products Div.**

The staff of FMC's Princeton laboratory will be increased from its present level of 150 to about 200 when the new wing is completed, and is expected to grow to 250 a year or so thereafter.

Modiglass Fibers, Inc. is constructing a 10,000 sq. ft. addition to its present manufacturing facilities at Bremen, Ohio. Occupancy is scheduled for mid-July.

Continental Plastics, Oklahoma City, Okla., plans to double the size of its plant and will install the latest type of equipment for injection molding and automatic handling, to be used primarily in custom molding. The company also manufactures proprietary pharmaceutical vials.

Chicago Molded Products Corp. has acquired **Capac Plastics, Inc.,** Minneapolis, Minn.

The Capac plant will be modified to incorporate the techniques of the Chicago, Ill., plant for production of Campco sheet and film. **Edward F. Bachner, Jr.,** VP, will direct operations.

Shell Chemical Corp. has completed new facilities at its Houston, Texas, plant which increase its capacity to produce bisphenol-A by 50 percent.

Riverside Plastics Corp. is adding 14,000 sq. ft. to its existing plant in Hicksville, N. Y., and will use part of this space for increased research facilities. The project will be completed by July 1, 1959 and will cost $100,000.

The company manufactures reinforced plastic components for industry and, through a recently acquired subsidiary, the **Bischoff Chemical Corp.,** produces strippable plastics coatings for protective packaging of metal parts.

The Cal-Dak Co., manufacturer of tubular steel housewares, has purchased **The Plas-Tex Corp.,** Los Angeles, Calif., maker of polyethylene housewares.

Plas-Tex will continue to operate as a completely separate company, and **Joseph M. Jayne** will continue as executive VP. **Lloyd C. Nelson** becomes president of Plas-Tex in addition to Cal-Dak.

Plans call for a joint product design and development division, with all other departments continuing to operate independently.

Northern Plastics Corp., La-Crosse, Wis., has installed an automatic material-handling system that delivers plastic resins from underground storage tanks direct to coating machines, as part of a $150,000 plant and equipment expansion program. The new equipment will boost the company's production capabilities an estimated 35 percent.

Northern Plastics is a supplier of laminated plastics for electrical and electronic applications and for other industrial uses. In addition, the company produces printed circuits and fabricated parts, made from its own basic laminates.

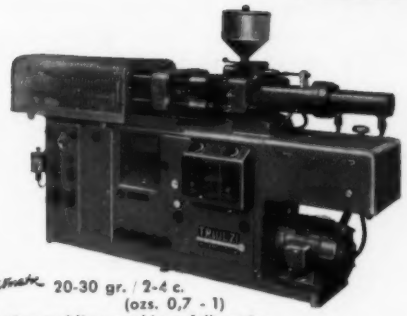
Owens-Corning Fiberglas Corp. plans to relocate its basic and applied research, and its product testing laboratories, now adjoining the company's Newark, Ohio, plant, to a 150-acre site near Granville, Ohio, where its pioneering laboratory is now established.

Construction of the new laboratories began April 15, with occupancy scheduled for late this year. The new facilities will consist of four buildings for a total of 100,000 sq. ft. of floor space.

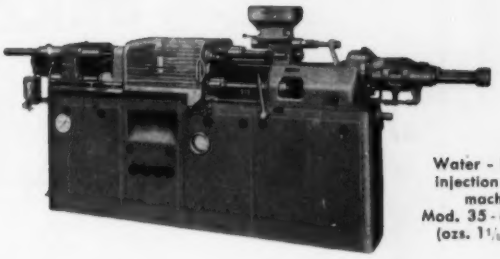
High Vacuum Mfg. Corp., Passaic, N. J., has installed a new 74-in. laminator **(To page 232)**

INJECTION MOLDING MACHINES

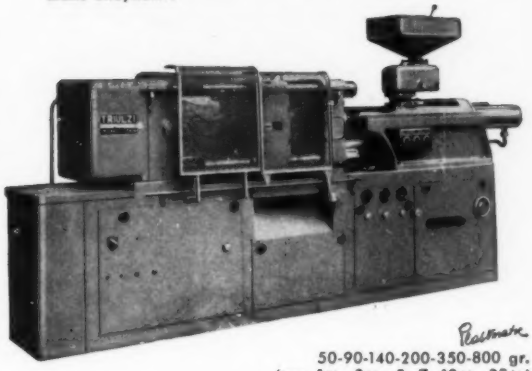
for Plastics



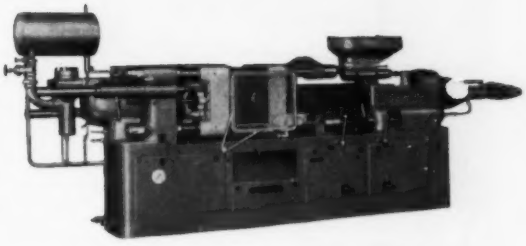
Plastmatic 20-30 gr. / 2-4 c.
(ozs. 0,7 - 1)
Injection molding machines fully automatic oildynamic



Water - hydraulic injection molding machines.
Mod. 35 - 60 - 90 gr.
(ozs. 1 1/5 - 2 - 3)



Plastmatic
50-90-140-200-350-800 gr.
(ozs. 1 3/4 - 3 1/4 - 5 - 7 - 12 1/2 - 28 1/4)
Injection molding machines fully automatic oildynamic



Water - hydraulic injection molding machines.
Mod. 120 - 200 - 350 - 600 gr.
(ozs. 4 1/5 - 7 - 12 1/8 - 21)

All our machines can be equipped with both PRE-PACK system and PREPLASTICIZER.

Models 1200-2500-4000-6000 gr.
(ozs. 42 1/3 - 88 - 141 - 211 1/5)

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Model PL 6 10
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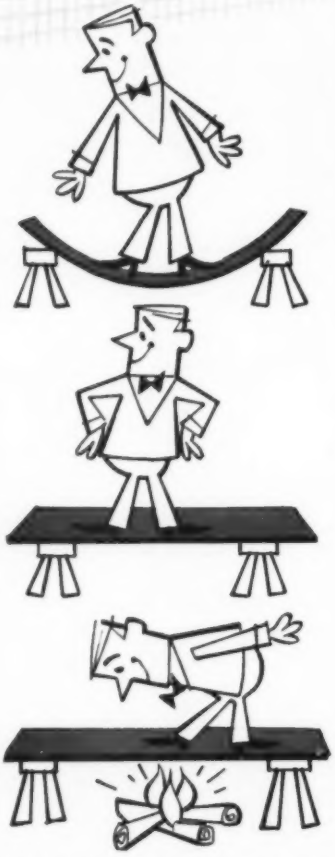

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Appreciably stiffer than regular polyethylene. Stiffness and higher heat distortion properties have provided many new production possibilities.

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High heat distortion (service temperatures up to 300° F), stiffness and inertness to environmental stress cracking have created new horizons for plastic applications.

The above materials are available in 48" wide rolls from 0.010" to 0.060" in thickness; also available in 48" x 96" sheets from 0.060" to 1.00" in thickness. We will welcome the opportunity to consult with you on your individual specifications. A letter or a phone call will start us working on your problem.

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PLASTICS DIVISION
SEIBERLING RUBBER COMPANY
Newcomerstown, Ohio • Phone: HYatt 8-8304

THE PLASTISCOPE

(From page 230)

built to coat or laminate plastics films, paper, or fabric. Top speed is 80 yards per minute. Automatic tension and web guides and double unwind and rewinds permit continuous operation.

U B S Chemical Corp., Cambridge, Mass., has put its new polymer plant in Lemont, Ill. on stream. The new facility will produce polystyrene based emulsions for the floor finish industry.

Morningstar-Paisley has begun production of polyvinyl acetate emulsions at its recently completed plant in Clifton, N. J. The company's Chicago plant has also announced increase of its output of these emulsions by 50 per cent.

Bemis Bro. Bag Co. is constructing a new 30,000 sq. ft. bag plant with facilities for extrusion of polyethylene liners and manufacture of plain and printed PE bags at Union City, south of Oakland, Calif.

James White, superintendent of the Bemis Plastic Package Plant at Terre Haute, Ind., will serve as production manager of the new plant, which will begin operation about June 30. **R. K. Wimer,** West Coast plastic bag specialist, has been appointed sales service manager.

Du Pont Film Dept. will almost double present facilities for the development of new packaging and industrial films at its Chestnut Run sales development and customer service laboratory. Construction will begin immediately and when completed in early 1960 will add about 23,000 sq. ft. of new floor space to the four-year-old laboratory at a cost of more than $1 million. The laboratory will house about 140 persons.

According to **Daniel D. Lanning,** manager of the laboratory, major programs are under way in connection with Teflon FEP-fluorocarbon film, polyolefin films, new types of Mylar polyester film and Type *R* polyvinyl fluoride film.

The new facilities also represent an expansion **(To page 234)**

ENGINEERED NYLON PRODUCTS, INC.

***Reduced overall cycle time* 32%**

***and cut production costs* 25%**

with a

MOSLO

Model 75-4

FULLY AUTOMATIC

MOLDING MACHINE

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WORLD'S FINEST PLASTIC INJECTION MOLDING MACHINES

MOSLO

MACHINERY COMPANY

2442 Prospect Avenue
Cleveland 15, Ohio

In the above illustration are (left to right) Mr. Charles Stephens, Plant Superintendent, and Mr. William C. Holden, Vice President & General Manager of Engineered Nylon Products; observing their Moslo machine in operation.

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specialists in molded nylon and thermoplastic products

engineered nylon products, inc.

enp
enp

Moslo Machinery Company
2442 Prospect Avenue
Cleveland, Ohio

April 1, 1959

Att: Mr. P. Sorensen

Gentlemen:

Several months ago we installed our first Moslo Model 75-4 Injection Press after a rather intensive survey of the equipment offered by various manufacturers and exhibited at the Chicago show last fall. As you know, we are specialists in the molding of industrial nylon products, and we were looking for equipment that would not only afford increased production speeds but also would provide a wide range of precision controls over the molding characteristics of our products. We are sure that you would be interested in knowing of the results we have been able to obtain on this equipment.

One of the most notable features of this machine has been found in the heating cylinder where we can now obtain excellent heat dispersion without over-heating the material. This improvement results in moldings which retain more strength characteristics than we have been able to obtain on our other machines, thereby providing us with definite quality improvement in our products.

The precise control possible on this cylinder, combined with other features of the machine, such as fast-acting moving platen, simplified mold set-up and reduced scrap shots, have combined to give us impressive manufacturing cost reductions -- in several cases as much as 20% and 25%. We feel that these results justify the purchase of additional equipment from you as we proceed with our planned improvement program on manufacturing facilities.

Very truly yours,
ENGINEERED NYLON PRODUCTS, INC.

William C. Holden

William C. Holden,
Vice President & General Manager

For the protection or decoration of plastics, and the production of metallized objects, there's a REZ-N-LAC coating by Schwartz.

Perfected through twenty years of pioneering research devoted exclusively to the plastics industry, REZ-N-LAC coatings never peel, flake or craze—are non-toxic and specifically formulated for each individual application.

Transparent or opaque colors, ranging the full length of the visible spectrum, are custom-matched for your individual requirements.

If you have a coating problem, contact our research laboratories. There's no obligation. Solving plastic problems is an integral part of our service. Specify the material to which the coating is to be applied and a sample and data sheet will be sent free.

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MANUFACTURERS OF DYES—LACQUERS—
CLEANERS—ADHESIVES— FOR PLASTICS

THE PLASTISCOPE

(From page 232)

of Du Pont's program to develop new and improved types of cellophane, including the new *K* or polymer-coated types.

Air Reduction Chemical Co., Div. of Air Reduction Co., Inc., has opened a new chemical laboratory and engineering office building adjacent to the company's pilot plants at Bound Brook, N. J. Research and development at the new center will support Airco's facilities at Calvert City, Ky., for the manufacture of vinyl acetate, vinyl stearate, methyl butynol, and methyl pentynol.

At Bound Brook, an expanded technical sales laboratory, headed by **Dr. C. E. Blades,** will work closely with customer companies in evaluating products and formulations, and exploring new applications.

Charles Crowl Co., El Monte, Calif., has more than doubled its floor space for production of melamine decorative laminates for the furniture and construction industries. The company also installed an automatic microsander and a new multiple-opening hot press for producing sheets up to 120-in. in length.

The Crowl Co. also manufactures ABS sheet for the aircraft industry; rigid and flexible PVC sheets up to 2-in. thick; decorative flexible vinyl laminated to plywood for the construction and trailer industries; and sheets for highway markers.

The Carwin Co., North Haven, Conn., has completed a second manufacturing unit which doubles capacity for the production of the variety of monoisocyanates, diisocyanates, and polyisocyanates, in which the company specializes. The new capacity has enabled the company to add ethyl isocyanate and phenyl isocyanate to its line.

Allied Chemical Corp. has completed negotiations with **The B. F. Goodrich Co.** for acquisition by Allied of the business and assets of **Harmon Colors.**

Harmon Colors has been part of **B. F. Goodrich Chemical Co.** division. Harmon produces organic pigments for automotive finishes, paints, textiles, rubber and plastics, printing inks, and flooring. Headquarters, laboratories, and manufacturing facilities are located at Haledon, N. J.

Carl H. Biggs Co., maker of epoxy compounds, has opened a new 12,000 sq. ft. plant at Santa Monica, Calif. The company was formed in 1950 to manufacture Helix epoxy bonding agents, and sales have doubled each year for seven straight years, with corresponding expansion of plant facilities.

Mobil Oil Co. is constructing a plant for the manufacture of high-purity ethylene, propylene, and butadiene, to be operated in Beaumont, Texas, by the **Magnolia Petroleum Co.** The new facility will have an annual capacity of 380 million lb. of ethylene, and will be built in several stages. Operation is scheduled to begin early in 1961.

Diamond Alkali Co. will construct a new multimillion dollar research center near Painesville, Ohio, scheduled for completion in late 1960.

The company is also expanding the Plastics Div. technical service and applications laboratory facilities at the Painesville research center. This project will cost an estimated $450,000 and will provide 5000 sq. ft. of additional laboratory space. Large experimental plastics processing equipment is also being installed.

Deceased

John B. Hendrickson, founder and chairman of the board of **Welding Engineers, Inc.,** died May 1. He headed the company through many phases of growth in metal-working, shipbuilding, and manufacturing of specialized plastics processing machinery. He was an inventor and holder of numerous patents, and pioneered the twin-screw method that is used in plastics processing.

J. Hendrickson

A report on Oronite Isophthalic

OPERATION "UPGRADE"

in the plastics industry

Oronite Isophthalic is well on its way as a significant new raw material for the plastics industry. The primary reasons for this are:

1. It is an aromatic dibasic acid derived from plentiful, low-cost petrochemical sources and is available in multi-million pound quantities.

2. It has been proven successful and shows great promise in saturated and unsaturated polyesters, polyamides, polyesters-amides, polyester-urethanes and copolymers.

3. Superior products are now being produced with Oronite Isophthalic in many fields; reinforced plastics, thermoset and thermoplastic molding compounds, films, fibers, foamed cellular materials, elastomers, plasticizers, plastisols, adhesives and coatings.

4. In most cases Isophthalic based materials require no special handling in their production and their performance qualities approach or surpass higher cost materials.

5. Oronite, the only experienced producer of Isophthalic, is able to supply the plastics maker technical assistance to convert Isophthalic into materials for his individual requirements.

FOR BULLETIN "Oronite Isophthalic—Key to Superior Plastic Products", address inquiry to Oronite's executive offices, San Francisco.

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...with the DE MATTIA 12/16 oz. Model M-1 fully hydraulic injection molding machine"

"Our machines must run 24 hours a day to meet our production requirements," says *Frank Ryk* of *Park Plastics Company*, Linden, New Jersey, "and with minimum down time.

"Our battery of new De Mattia 12/16-oz. fully hydraulic Model M-1 machines has increased our production 17 per cent.

"In view of the competitive toy and custom molding situation, we're standardizing on the fully hydraulic De Mattia. We can set up a mold and be in production in less than ten minutes when the cylinder heat is up to the required temperature."

BEFORE YOU BUY ANY MACHINE
Try your mold on the M-1 and be convinced!

CHECK THESE SPECIFICATIONS
and write for complete data

PLASTICIZING CAPACITY	over 150 lbs./hr.
MAXIMUM DAYLIGHT	32"
CLAMPING PRESSURE	400 tons
MAXIMUM MOLD SIZE	20" x 30" horiz. 16" x 32" vert.

- 12 DRY CYCLES PER MINUTE
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COMPANIES...PEOPLE

Appointments, promotions, and relocations in the plastics industry.

Allied Chemical Corp., Solvay Process Div.: Wilbur H. Brumfield appointed exec. VP and **Raymond Largent,** VP.

Dr. Robert H. Reed named asst. dir. of development, succeeding Mr. Largent; **Dr. Herbert C. Wohlers** becomes dir. of research, the post formerly occupied by Dr. Reed. **Dr. Alan G. Follows** appointed asst. dir. of research.

Tech Art Plastics Co., Morristown, N. J., was purchased by **J. Harry DuBois,** plastics consultant and a dir. of **National Beryllia Corp.** He becomes chrmn. of the board of Tech Art. **Harold J. Cook** continues as pres., **John P. Lombardi,** formerly plant mgr. of Shaw Insulator Co., appointed VP.

J. H. DuBois

Tech Art Plastics Co. was established in 1891, and today specializes in fully automatic custom molding of thermosetting and thermoplastics materials, (injection, transfer, compression).

Hooker Chemical Corp., Durez Plastics Div.: Henry B. Puff named asst. product mgr.—resins, **Edwin E. Woodman** appointed dist. sales mgr. of Chicago, Ill. office to succeed Mr. Puff. **William J. Parmley** appointed works mgr. of the Kenton, Ohio plant.

NAFI Corp. is the new name of **National Automotive Fibres, Inc.,** Detroit, Mich.

Filon Plastics Corp., El Segundo, Calif., opened a sales office in the Circle Tower, Indianapolis, Ind. **Ralph Perkinson** named regional sales mgr.

Barclay Mfg. Co., Inc.: Walter Cowan to head the Barcwood Div., and **Ernest Swanson** named export mgr. for Barcwood, Barclite and Barclay products.

The Barcwood Div. produces plastic-coated wood-grain paneling. The Barclite Div. turns out translucent and decorative fibrous glass reinforced plastic panels, while the Barclay Div. manufactures solid color and tile-scored prefinished plastic-coated panels.

Owens-Corning Fiberglas Corp.: Louis R. Kessler, formerly VP and gen. mgr. of the General Products Div., elected to the new position of operations VP. **William H. Curtiss, Jr.,** former Pacific Coast Div. VP and gen. mgr., named to the post of VP and dir. of marketing. He is succeeded by **John H. Thomas,** presently VP and gen. mgr. of the Textile Products Div. **Ben E. Boyd** appointed mfg. VP. He formerly was VP-mfg. of the General Products Div.

Metal & Thermit Corp.: Herbert E. Hirschland elected VP in charge of commercial development.

Donald R. Meserve named sales mgr. of the Organic Coatings Div.

Continental-Diamond Fibre Corp., subsidiary of **The Budd Co.: W. R. Gotshall** named dist. mgr. of the Indianapolis, Ind. dist. sales office. He replaces **R. E. Tappan,** retired.

J. Franklin Anderson, VP, retired.

Spencer Chemical Co.: Edward L. Stevens, formerly works mgr. of the company's polyethylene plant at Orange, Texas, now general sales mgr., succeeding **William Schopflin,** who becomes asst. to the VP.

Robert A. Byorum, formerly chief engineer and construction mgr. for Spencer with offices in Kansas City, Mo., succeeds Mr. Stevens as works mgr. of the Orange plant. **R. W. Hogeboom,** formerly asst. chief engineer, becomes the new chief engineer and construction mgr.

R. J. Bailey, formerly dist. sales mgr. in Chicago, Ill., becomes field sales mgr. with offices in Kansas City, succeeeding **Franklin E. Eck,** who will transfer to product mgr., nylon, replacing **Robert H. Reid,** who is transferring to Orange as production specialist.

C. J. Bridgen, formerly polypropylene product mgr., will succeed Mr. Bailey as dist. sales mgr. in Chicago. **W. R. Claypoole** will succeed Mr. Bridgen as product mgr.

Specialty Paper and Board Affiliates, Inc., Polyethylene Extrusion Coaters Group: Malcolm McVickar, Crocker, Burbank Papers, Inc., Fitchburg, Mass., re-elected chrmn., and **E. D. Mendels, Ludlow Papers, Inc.,** Needham Heights, Mass., elected V-chrmn., for the ensuing year.

Donald McBride, Jr., Lowe Paper Co., Ridgefield, N. J., and **John T. Wolfe, Crown Zellerbach Corp.,** San Francisco, Calif., elected to the exec. committee.

The Group is composed of 17 companies concerned with PE extrusion coating on paper, paperboard, film, foil and other substrates.

General Aniline & Film Corp.: Philip M. Dinkins, pres., named chief exec. officer. **John Hilldring,** who had served as chief exec. officer, re-elected chrmn. of the board.

Dyestuff & Chemical Div.: Dr. Chapin E. Stevens appointed dir. of commercial development. **J. Robert Bonnar** named dir. of marketing.

Charles C. Cayce named to newly created post of Southern regional mgr.

Du Pont: Crawford H. Greenewalt, pres., received the Gold Medal of the American Institute of Chemists for 1959, for his "outstanding leadership in the chemical industry, and his effective support of professional worth and dignity and also individual initiative."

C. Greenewalt

Polychemicals Dept.: Doyce B. Hanson, mgr. of tech. services for the Plastics Sales Div., appointed product mgr. in the dept.'s R & D Div. Mr. Hanson's responsibilities in the Sales Div. will be taken over by **Irenee du Pont, Jr.,** laboratory dir. of the Plastics Sales Service Laboratory at Chestnut Run, Del., near Wilmington. **Edward S. Davis** appointed program mgr. in the Plastics Sales Div.

NRC Equipment Corp., Newton, Mass., established a West Coast engineering office at 499 Hamilton St., Palo Alto, Calif. **Edward G. Ferrari** appointed mgr.

Heyden Newport Chemical Corp., Heyden Chemical Div.: Dr. T. R. Aalto appointed product sales mgr., Fine Chemicals; **E. L. Barkley,** product sales mgr., Synthetic Resin Chemicals; and **T. H. Risch,** product sales mgr., Organic Intermediate Chemicals.

The New York and New Jersey branch offices have been consolidated. **J. Claypoole,** mgr. of the N. J branch office, absorbing Mr. Risch's duties as mgr. of the N. Y. branch.

Hostachem Corp. is the new name of **Progressive Color and Chemical Co., Inc.,** 350 Fifth Ave., New York, N. Y. The personnel and the address will remain the same.

The company will continue to act as distributors in the U. S. for **Farbwerke Hoechst AG.** and its subsidiary companies, **Knapsack-Griesheim AG., Kalle & Co., AG., Anorgana G.m.b.H.,** and **Behringwerke AG.**

The name of **The Uhde Corp.** has also been changed and is now **Hoechst-Uhde Corp.** The company, a subsidiary of **(To page 240)**

Rugged reinforcement at low cost

Reinforce your plastic products with a fiber glass woven roving that's consistently uniform—in weave, sizing and strength. Every roll of UNIROVE is checked against Ferro high-quality standards at every stage of production. This gives you extra value at low woven roving costs.

Every roll you receive must conform to the highest "specs". Write for samples, specifications, prices.

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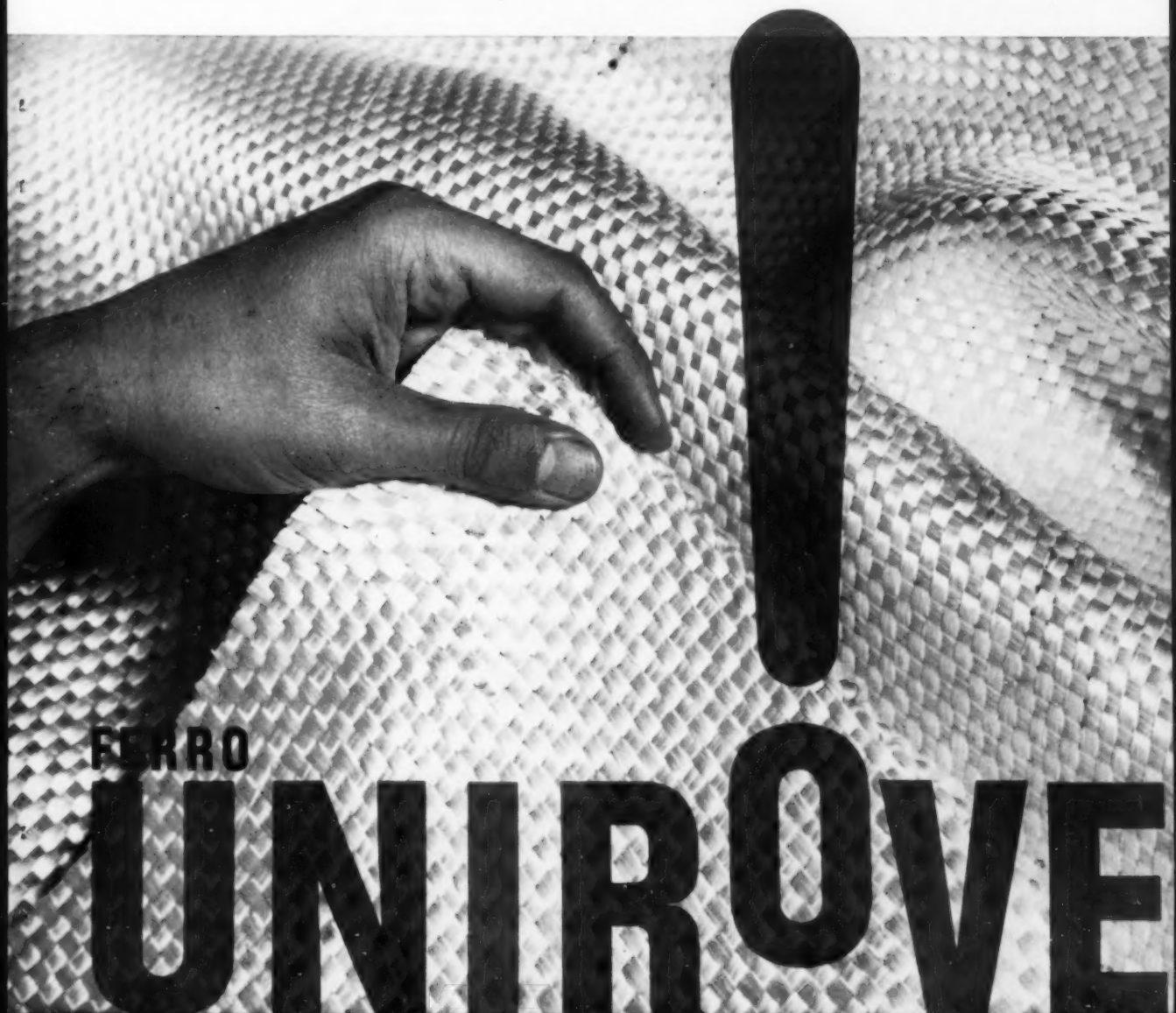

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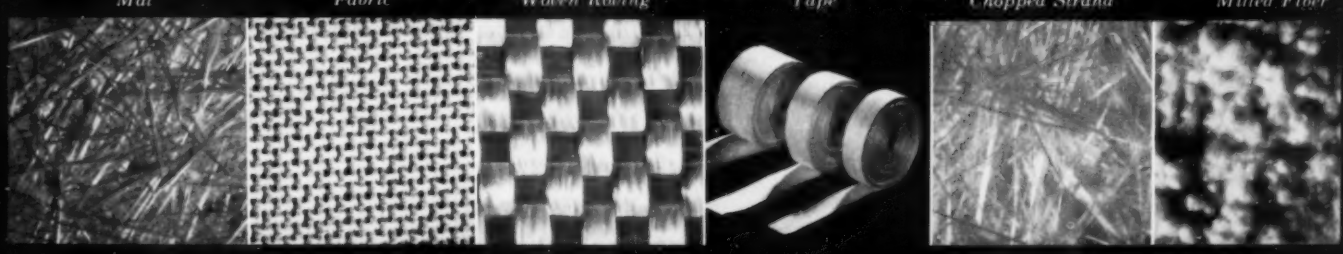
Mat *Fabric* *Woven Roving* *Tape* *Chopped Strand* *Milled Fiber*



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KESSLER CHEMICALS

COMPANIES...PEOPLE

(*From page 238*)

Farbwerke Hoechst AG, Frankfurt-Hoechst, West Germany, offers the processes for licensing from the parent company and its production subsidiaries, as well as processes from the Hoechst engineering subsidiary, Friedrich Uhde G.m.b.H.

Witco Chemical Co., Inc.: William H. Thorbecke elected VP in charge of International Div.

William O. Blesse appointed supt. of operations of new phthalic anhydride plant in Chicago, Ill.

Lily-Tulip Cup Corp.: Robert J. Hlavin appointed mgr. of Packaging Products.

D. Lee Mahon named Central Midwestern regional mgr.

Reichhold Chemicals, Inc., Plastics Div.: Donald G. Patterson named mgr. of the new Div. He will be responsible for all company activities in the plastics area, with the exception of phenolics. In addition, he will act as tech. coordinator for the recently acquired **Specialty Chemicals Div.**

William F. Turner named sales mgr. and **Charles S. Stryker** tech. service mgr. of the Polyester and Epoxy Resins Dept., which was previously headed by Mr. Patterson and will operate as a section of the Plastics Div.

Borden Chemical Co.: John R. Stanley named sales mgr. for Resinite garden hose products. **Lee Turhune** appointed asst. development mgr. at the Resinite Dept. plant in North Andover, Mass.

Armstrong Cork Co., Glass & Closure Div.: P. W. Triplett, mgr. of the Detroit, Mich. dist. office, promoted to mgr. of the Chicago, Ill. dist. office; **John H. McCrea,** formerly mgr. of the Cleveland, Ohio dist. office, succeeds Mr. Triplett. **H. Glenn Eshelman** succeeds Mr. McCrea at Cleveland.

Institute of Printed Circuits: W. J. McGinley, pres., **Methode Mfg. Co.,** re-elected to serve his second term as pres. **R. G. Zens,** VP of **Printed Electronics Corp.,** elected IPC VP. Dirs. of the Institute for 1959 include **K. W. Clayton, Tingstol Co.; R. C. Rennie, Bureau of Engraving, Inc.; P. P. Pellegrino, Photo Color Process Corp.;** and **Charles Sabel, Precision Circuits, Inc.**

Atlas Powder Co. announced plans for moving its Thermaflow plastic molding compounds mfg. operations from Tunkhannock, Pa., to its Atlas Point plant near Wilmington, Del. The consolidation will result in the closing of the Tunkhannock plant, effective July 1, 1959. The principal reason given for the consolidation was to move mfg. facilities closer to raw materials, shipping installations, physical test laboratories, R & D facilities and key tech. people available at the Atlas Point plant.

The Society of the Plastics Industry, Inc. elected the following officials to serve for a two-year term: **C. Russell Mahaney, Panelyte Div., St. Regis Paper Co.,** N.Y., N.Y.—chrmn. of the board; **R. C. Weigel, Du Pont,** Wilmington, Del.—pres.; **R. L. Davidson, Kurz-Kasch, Inc.,** Dayton, Ohio—VP; and **E. J. Caughlin, American Insulator Corp.,** New Freedom, Pa.—

C. R. Mahaney

R. C. Weigel

R. L. Davidson

E. J. Caughlin

secy.-treas. These officials were also elected directors of the Society.

At the same time, the SPI elected sectional directors, industry division directors, and directors at large, to serve from June, 1959 to June, 1960.

Union Carbide Corp.—Union Carbide Chemicals Co.: Dr. Richard J. Kerr named product mgr. of the newly created Urethane Intermediates group in the New Chemicals group.

Andrew H. Black transferred to the Chicago, Ill. dist. from New York, N. Y., and **John F. Flynn** to the New York dist. from Boston, Mass. Both are tech. reps. **Larry E. Sweeney** joined the development dept. in South Charleston, W. Va.

Union Carbide Canada Ltd.: F. Perry Wilson elected to the newly created office of exec. VP.

Francis H. Snyder & Associates was reorganized as a corporation. Mr. Snyder, owner and dir. of the original business, continues as pres. and chrmn. of the board. **Lewis C. Wallace** is VP.

The firm will continue to maintain offices and laboratories at 29 Church St., New Milford, Conn. and a process development div. on Federal Rd., Brookfield, Conn.

Sun Chemical Corp.: John H. Scherer named gen. mgr. and **Edward C. M. Homan** dir. of research and product development at the Electro-Technical Div. in Nutley, **(To page 242)**

Materials designed to do a specific job are best and most economical in the long run, because they provide a maximum of special properties required for the job.

In a Premix Compounding resin, for example, you need:

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- Good shelf life and long catalyzed stability.
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Lauroyl Peroxide	95.0%	(Min.)
Active Oxygen	3.76%	(Min.)
Free Fatty Acids as Lauric Acid	1.5%	(Max.)
Alkaline Soaps as Calcium Laurate	1.5%	(Max.)

THERMAL DECOMPOSITION.

Material	Solvent	Temp. °C.	Half Life in Hours
ALPEROX C	Benzene	100	0.1
Benzoyl Peroxide	Benzene	100	0.33
ALPEROX C	Benzene	70	3
Benzoyl Peroxide	Benzene	70	12

ALPEROX C (Technical Lauroyl Peroxide) is the preferred catalyst for the suspension polymerization of vinyl chloride. Concentrations of 0.1 to 1.0% confer greater heat stability on the final product and facilitate higher conversion velocity. As a catalyst for curing polyester resins, it is especially applicable to the production of small, clear, transparent castings, setting at a temperature of 60° to 80°C. For cold setting with tertiary amines as accelerators, less discoloration occurs than when using benzoyl peroxide.

WRITE FOR DATA SHEET No. 3

LUCIDOL DIVISION

WALLACE & TIERNAN INCORPORATED
1740 MILITARY ROAD
BUFFALO 5, NEW YORK

COMPANIES...PEOPLE

(*From page 240*)

N. J. The Div. produces specialty coatings and plastics, low pressure laminates, chemically impregnated fabrics, and papers and insulation materials for electrical parts and equipment.

Tennessee Products & Chemical Corp.: Donald J. Collins elected VP—marketing, and **Richard I. Goodkind** named VP for administration. The company mfrs. plasticizers and agricultural chemicals.

The Black-Clawson Co., Dilts Div.: R. W. Phelps appointed mgr. of engineering and product development. **James J. Melead** named chief engineer. **Jack Dain** promoted from slitter-winder sales dir. to asst. sales mgr.

Maurice Anderson assigned to the newly created position of standards engineer. **Clem Lorenz,** formerly development engineer on the slitter-winder line, assigned to sales service engineering.

Monsanto Chemical Co.: C. Judd Holt, Jr., formerly with the Plastics Div., Springfield, Mass., promoted to PR rep. in St. Louis, Mo.

Plastics Div.: Thomas O. Lee, Jr. joined the Saflex (safety glass interlayer) dept.

U. S. Rubber Co.—Naugatuck Chemical Div.: Travis W. Brasfield appointed Kralastic commodity sales mgr., succeeding **Arthur K. O'Keefe,** recently elected pres. of the **Texas-U. S. Chemical Co.**

AviSun Corp.: Carl A. Setterstrom appointed asst. to the pres. and also named dir. of the company's commercial development div.

Dr. Edward T. Severs named product mgr.—polymers, in the commercial development div.; and **Earl M. Honeycutt** as mgr. of mfg.—polymers. **Dr. A. Ross Adams, Neil A. Hansen,** and **James C. Warren** named product engineers—polymers, in commercial development.

Nicholas E. Carr named mgr. of mfg.—film and fiber. **John Adrian** named sales mgr.—films. **Robert Ridgway** and **Ralph M. Winters, Jr.** are both assigned to the film group in commercial development. All four were transferred from **American Viscose Corp.**

National Tool Co.—Auto-Vac Co. Div.: Millard Demarest appointed sales mgr.

Auto-Blow Corp.: Glenn A. Tanner named sales mgr.

Johns-Manville Fiber Glass, Inc.: John A. Morgan, VP and gen. mgr. of the Corona, Calif. operation, transferred to **J-M Sales Corp.** as mgr. of Pacific Coast aviation sales. **Eugene Sinnett** **(To page 245)**

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The NEW element in production!...

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from **BORG-WARNER**

Better in more ways than any other plastic!

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COMPANIES...PEOPLE

(From page 242)

becomes the new Corona plant mgr. He was formerly mgr. of the Corrulux Div. of L.O.F. Glass Fibers Co., which merged with Johns-Manville.

Leon McDuff named supt. of aircraft operations.

Schenectady Varnish Co., Inc.: Henry D. Wright elected pres. succeeding his father, the late **W. Howard Wright**, who founded the firm. **Clinton A. Braidwood** was elected VP.

Rubbermaid, Inc.: E. J. Fredericks and **L. E. Gigax** elected VPs to head sales and mfg. operations, respectively.

Mrs. Wanda M. Snyder appointed to the newly created position of home office asst. to retail sales reps.

Herbert A. Goeden elected pres. of the Milwaukee, Wis. section of SPE. He is chief of mfg. service for the Conolite plastic laminate dept. of **Continental Can Co.'s** Flexible Packaging Div.

Emerson C. Jones appointed mgr. of tech. service for polyvinyl chloride resins and compounds, **Eleonora Chemical Div.** of **The Pantasote Co.**, Passaic, N. J. and New York, N. Y.

Maynard C. Wheeler elected pres. of **Commercial Solvents Corp.**, succeeding **J. Albert Woods**, who is continuing his association with the company as a consultant.

Raymond Arnold named gen. mgr. of **Architectural Plastics Corp.**, Eugene, Ore.

Dr. Robert C. Springborn joined **Marbon Chemical Div., Borg-Warner**, as mgr. of research.

August Napravnik named production mgr. in charge of all mfg. facilities for **Catalin Corp. of America.**

James W. Sedore, former sr. project engineer, named dir. of contracts for **Lunn Laminates, Inc.**

Eugene F. Warren, appointed asst. to **Arthur Schubert**, exec. VP of **Emery Industries, Inc.**

Judson W. Arnold appointed to the newly created post of dir. of development for **Shawinigan Resins Corp.**

Robert S. Lambert, Jr. appointed mgr. of manufacturing of **Air Accessories, Inc.**, Fort Worth, Texas. He will be in charge of methods and tooling for the firm's **Del-Tex Marine Products Div.**, (plastics marine windshields and other formed plastics accessories and parts), **Sunlounger Div.**, (reinforced plastics furniture); **Floor Show Div.**, (plastic office chair mats **(To page 246)**

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. . . high-precision jobs involving close tolerance work such as intricate coring and internal threads. The *full range* of hard-to-find, specialized services we provide embraces:

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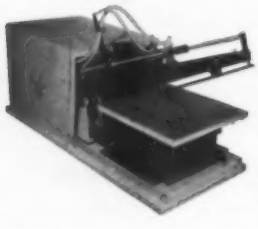

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COMPANIES...PEOPLE

(*From page 245*)

and other office accessories); the **Toy Div.** (plastic hoops) **Delta Products Div.** (honeycomb and sandwich structural panels).

Paul Winz joined the laboratory staff of the **Mesa Plastics Co.**, Los Angeles, Calif.

Bernard Gordon appointed dir. of foreign operations of **Wasco Chemical Co., Inc.**

F. S. (Stan) Bryant appointed tech. sales rep., custom industrial molding div., **Midland Plastics**, Toronto, Ont., Canada.

Joe Foss, former South Dakota governor, joined **Raven Industries, Inc.** as VP. The Sioux Falls, S. D. company designs and builds plastic balloons, instrumentation and controls. Mr. Foss will be in charge of sales and public relations.

Robert A. Brewer appointed asst. to **Edward L. Mahoney**, dir. of sales, Vinyl Metal Products Div., **Columbus Coated Fabrics Corp.**, Columbus, Ohio.

Robinson F. Edgar appointed marketing mgr. of the Industrial Hose Div. at **Flexonics Corp.**

Albert B. Nichols, Jr. appointed gen. sales mgr. of the **Bradley-Sun Div., American Can Co.**

Earl Erdman joined **Taylor Fibre Co.**, Norristown, Pa., as group leader for the firm's resins research section.

David E. McElroy named mgr. of the newly formed Plastic Products Div. of **International Resistance Co.** He will be responsible for production and development of plastics products, including etched flexible circuit cable, premium-quality laminates and flat flexible cable.

Russell B. Galloway appointed gen. sales mgr. of **Synthane Corp.**, Oaks, Pa.

Frank R. Edmisten named plant mgr. for the new plastic facility of **Vulcan Corp.** at Portsmouth, Ohio.

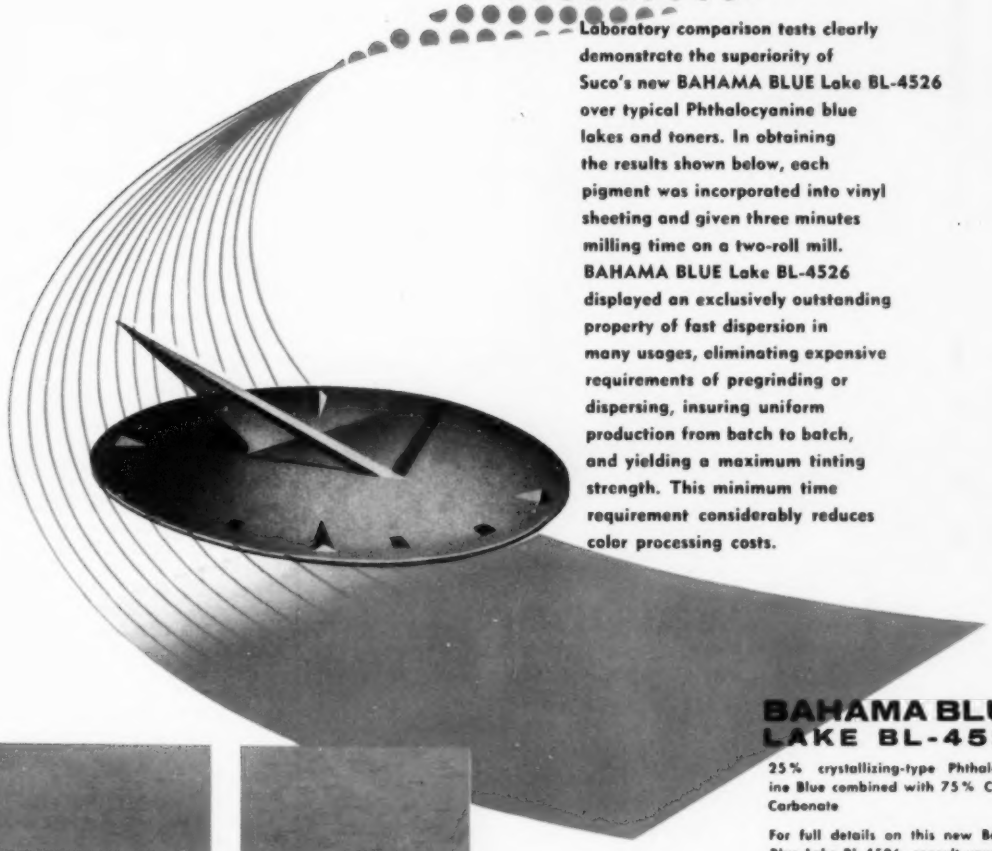
Robert W. Wert appointed field rep. for chemical distributor operations for **Minerals & Chemicals Corp. of America**, Menlo Park, N. J.

Aimison Jonnard joined **U. S. Industrial Chemicals Co.** as asst. mgr.—polymer planning and applications.

J. H. Overholser, founder and pres. of **Hydrodyne Corp.**, North Hollywood, Calif., sold his interest in this company and became VP, sales and engineering, at **Turbo** **(To page 248)**

BAHAMA BLUE LAKE BL-4526

Lowers Color Processing Costs . . .



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Phthalocyanine Blue Lake

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25% crystallizing-type Phthalocyanine Blue combined with 75% Calcium Carbonate

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COMPANIES...PEOPLE

(*From page 246*)

Products, Inc., Pacoima, Calif. He will be in charge of all sales and engineering activities for the firm's five divs.: **Awica Clamps, Turbo Products, Lefco Plastics, U. S. Propellers,** and **U. S. Honeycomb.**

Raymond R. Chapman named mgr. of the plastics plant of **Sylvania Electric Products, Inc.,** Warren, Pa.

Herman R. Hutchinson elected a VP of the **Plastomatic Corp.,** Malvern, Pa.

Cornelius D. McGrath appointed field sales mgr., chemical sales dept., **Atlas Powder Co.**

George C. Kroening named VP in charge of sales of **Northern Plastics Corp.,** LaCrosse, Wis.

Richard S. Baumgartner appointed gen. sales mgr. of **Avsco Plastics, Inc.,** custom injection molder, Excelsior Springs, Mo.

New reps.

Claude Mann & Assocs. Wichita, Kan., named distributor for **Ren Plastics, Inc.,** Lansing Mich. . . . **Barclite Corp. of America** appointed the following distributors for its RP panels: **Dealers Supply,** Durham and Charlotte, N. C.; **The American Sash and Door Co.,** Toledo, Ohio; **Plastics Mfg. and Supply Corp.,** Cleveland Ohio; **Dixie Plywood Co.,** Atlanta, Ga.; and **Sanford Gold,** Providence, R. I. in the U. S., and **Pilon Ltee.,** Hull, Quebec; **Lefaivre and Sabourin Ltee.,** Montreal; and **Primco (Western) Ltd.,** Calgary, Alberta, in Canada . . . **Whitlock Associates, Inc.,** Oak Park, Mich., appointed the following reps. to handle its line of dryers and conveyors for the plastics industry: **Texas Plastic Machinery & Supply Co.,** Houston, Texas; **Bossert Co.,** Kansas City, Mo.; **Air Hydraulics Co.,** St. Louis, Mo.; **Plastics Machine Div., Burleigh-Stocker Machine Tool Co.,** Pleasant Ridge, Mich. . . . **Dr. Allan R. A. Beeber** named tech. rep. in the U. S. of the **Winterbottom Industries, Ltd.,** Manchester, England. He is VP of **Arkwright Finishing Co.,** Fiskeville, R. I., one of the 17 affiliates of Winterbottom . . . **Dryco Chemical Co.,** Baltimore, Md., named distributor for **Antara Chemicals,** a div. of **General Aniline & Film Corp.**

Correction

"Decorating Molded Plastics" (MPL, April 1959, p. 94): Only the nylon part in the lower left-hand corner of the photo captioned "Four ways to precision mark . . ." was decorated by **The Acromark Co.** The other parts were hot-stamped and otherwise decorated by **V. H. Swenson Co., Inc.,** Arlington, N. J.

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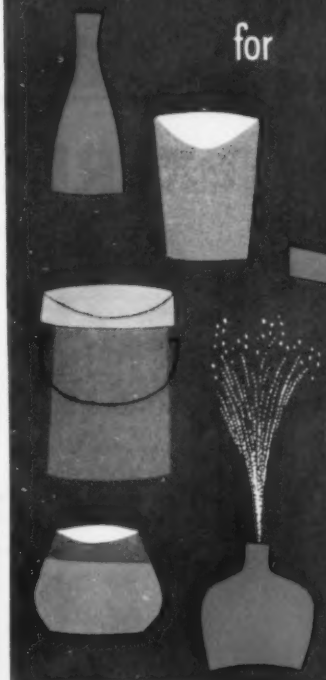

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FOR SALE: 1-Robinson #1630 Plastic Cutter with 30 HP explosion proof motor, late model, excellent condition, attractively priced. Reply Box 5600, Modern Plastics.

FOR SALE: Ovens, Grinders, Powder Mixers, Injection Molding Machines 1 oz. to 60 ozs. never used and used. Two-head Bottle Blowing Machine. Acme Machinery & Mfg. Co., Inc., 20 South Broadway, Yonkers, N.Y. YOnkers 5-0900, 102 Grove Street, Worcester, Mass. PLeasant 7-7747, 5222 W. North Ave., Chicago, Ill. TUxedo 9-1328.

FOR SALE: 5—Unused Baker Perkins size 15 JIM2, 100 gal. steam jacketed double arm Mixers; 1—Baker Perkins size 16 TRM, 150 gal. double arm Mixer; 1—Ball & Jewell #1 Rotary Cutter; 1—Kent 6" x 14" three roll Mill; 6—Stokes Model DD2, DS3, D3 and B2 Rotary Preform Presses; 4—Stokes Model "R" single punch Preform Presses. Also: Sifters, Banbury Mixers, Powder Mixers, etc., partial listing; write for details; we purchase your surplus equipment. Brill Equipment Co., 2407 Third Ave., New York 51, N.Y.

FOR SALE: 43—Baker-Perkins #17, 200 gal. jacketed mixers, sigma and duplex blades, many with individual 30 HP motors and drives, power-screw tilts. 2—Baker-Perkins 100 gal., sigma or dispersion blades, jacketed. 3—Baker-Perkins 50 gal., sigma blades, jacketed. 2—J. H. Day 35 gal. sigma blade. Perry Equipment Corp., 1429 N. 6th St., Phila. 22, Pa.

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FOR SALE: Baldwin-Southwark 200 ton semi-automatic transfer molding press. French Oil 250 ton 38" x 28". 200 ton hobbing press. 200 ton 16" record presses. French Oil 120 ton self-contained. Hydraulic pumps and accumulators. New ¾ oz. Bench model Injection Machines. Van Dorn 1 to 2½ ounce. Lester 16 oz. and Reed 22 oz. Other sizes to 100 oz. Baker-Perkins and Day jacketed mixers. Ball and Jewell #2 Plastic Grinders and other sizes. Seco 6" x 12" and 8" x 16" mills and calenders. Hartig 3¼" Plastic Extruder. MPM 2" and NRM 1". Thropp 3" x 8" Lab. two roll Plastic Mill. Single and Rotary preform presses ½" to 4". Partial listing. We buy your surplus machinery. Stein Equipment Co., 107-8th St., Brooklyn 15, New York.

FOR SALE: H.P.M. Rubber Injection molders, 21½" x 28" mold space, steam heated platens. Watson-Stillman 300 ton semi-automatic compression molding press (1947) self-contained mold size 34"x27". Watson-Stillman 250 ton 28"x24". Watson-Stillman 140 ton 22"x16". Waterbury Farrel 85 ton 20"x24". Laboratory presses—15 ton 10"x8" and 10 ton 6"x6" platens. (1) 8 ounce Lester Phoenix Injection Molder (late) with nylon attachment. Scrap cutters. Presses—all sizes. Aaron Machinery Co., Inc., 45 Crosby St., New York, N.Y. Tel.: WAlker 5-8300.

FOR SALE: 1—Cumberland 7" stair step dicer, stainless; 2 compression molding presses, 470 and 265 tons; 1 Defiance #20 preform press; 1—100 cu. ft. jacketed steel ribbon blender; 2 Ball & Jewell rotary cutters, 2, 5 HP; also extruders, mills, etc. Chemical & Process Machinery Corp., 52 9th St., Brooklyn 15, N.Y. HY 9-7200.

THIS MONTH'S SPECIALS: 20" x 22" x 60" Top Cap Rubber/Plastic Mill. Complete with 125 HP motor and reduction unit. This mill still on location and can be inspected under power; 230 ton full automatic up-moving plastic molding press. 54" x 24" up-moving platen fully guided. Complete with T-slotted spacer blocks, top and bottom knock-outs, and mounted on reservoir tanks with self-contained pump and motor. Push button station for manual semi-automatic and automatic operation; we also have available 21—1 ratio plastic extruders in sizes up to 3½"; a complete line of ovens, blenders, mixers, LaRose Preheaters, mills, injection molders, presses, etc., etc., for the plastic and rubber industry. We Will Finance. Johnson Machinery Company, 683 Freilnghuysen Ave., Newark 12, New Jersey, Bigelow 8-2500.

FOR SALE: 2 DeMattia 12 oz. Injection Molding Machines—1947. Can be seen in operation. $4000.00 each. Wrap-ade Packaging Machine with Sealing Rollers 2½ x 4¼" cellophane package (may be changed) with 5' pusher conveyor—$3000.00. Acromark 2AH Rotary Dial Table Hot Stamping Press—$3000.00. Park Plastics Company, Linden, New Jersey, HU 6-9300.

FOR SALE: One 1950 48 oz. Watson-Stillman Injection Molding Machine with 60 oz. Heating Cylinder. In excellent condition. May be seen in operation. Reply Box No. 5606, Modern Plastics.

FOR SALE: One—#2 Ball and Jewell Grinder, Serial #2-797-X, 30 h.p. motor; in good operating condition, offered at an attractive price. Reply Box 5609, Modern Plastics.

FOR SALE: Vacuum forming machines—excellent condition. 25" x 25" area, automatic cycle, roll take off. $1850. 16" x 16" area, automatic cycle, $750. Atlas Vacuum Corporation, 340 Lyell Ave., Rochester 6, N.Y.

FOR SALE: One Used, Heavy Duty, 14" Cumberland Pelletizing Machine. (Strand Cutter) Machine like new, used only a few months. All stainless steel construction. 8 stainless steel rotor knives, 1 stainless steel bed knife. Complete with 5 HP variable speed drive. Davco Machine Tools, Inc., 82 Herbert St., Framingham, Mass. Phone, Trinity 5-0606.

PLASTICS EQUIPMENT AVAILABLE: Autoclave, insulated, reinforced for vacuum service, 9' x 14'. Elmes press, 100 ton, 48 x 48 bed, steam & cooling plates, for plastic molding. Walk-in industrial oven, inside dim. 5' x 9' x 6' high. Vacuum pump with 1 h.p. motor, polyester spray. Steam generator 60-115 psi. Water softener. Southern Ohio location. All equipment like new. For catalog write Box 5608, Modern Plastics.

FOR SALE: One 1952 Vacuum Metallizer CVC Horizontal type 48" by 60" with all necessary equipment. Excellent condition. May be seen in operation. Reply Box No. 5607, Modern Plastics.

POWDER BLENDERS: 10,000 lbs. Lab. Mill 6x16. 3 S.S. Centrifugals 40" bottom discharge & plow. Baker Perkins 150 gal., 2 arm, 40 HP; 100 gal., 2 arm, 50 HP, S.S. jacketed vacuum hydr. tilt. Stokes—3 DDS2, 2 DS3. Calenders 3 Roll 45" x 18, 6 Roll 12" x 5. 1000 ton Hobbing Press. Ball Mill. Hyd. Pumps Machinecraft Corp., 800 Wilson Ave., Newark 5, N. J.—Mitchell 2-7634.

FOR SALE: Robbins Plastic sheet stacker for sale. Built 1955 never used. Will stack sheets up to 50" by 12'. No reasonable offer refused. Allied Resinous Products, Conneaut, Ohio. Phone: 91-001.

Machinery wanted

WANTED: Two 15-Ton Stokes Automatic Presses with air powder feed and air push-off. Will consider only presses with both air feeds. Reply Box 5647, Modern Plastics.

WANTED TO BUY: Used injection molding machines, oven, granulators. One machine or complete plant. Acme Machinery & Mfg. Co. Inc., 20 South Broadway, Yonkers, N.Y. YOnkers 5-0900, 102 Grove Street, Worcester, Mass., PLeasant 7-7747, 5222 West North St., Chicago, Illinois, TUxedo 9-1328.

WANTED: Watson Stillman 16 ounce Injection Molding Machines. Good condition. Reply Box 5610, Modern Plastics.

Materials for sale

FOR SALE: Priced for quick sale, approximately 20,000 feet Butarate Pipe (Tenite) 1" to 3" in standard wall and thin; also approximately 5,000 feet 475 Styrene 1¼ OD tubing in foot lengths. All material for sale under raw material cost. Contact National Materials Company, 1708 State Street, Houston, Texas.

MATERIALS FOR SALE: Seventy Thousand Pounds of Mixed Colored Cellulose Acetate. Would convert into Black or Dark Color. Also—offer us your surplus molding compounds and plastic scrap. Claude P. Bamberger, Inc., Ridgefield Park, N.J. HUbbard 9-5330.

FOR SALE: General Purpose, Medium and Hi-Impact Polystyrene and Polyethylene molding materials for sale in any color or quantity. Packed in 50 lb. bags. Now at our lowest prices in years. For top quality materials, at big savings, write: Gering Products, Inc., Kenilworth, New Jersey, Department M. Or call: (N.J.) BRidge 6-2900.

Materials wanted

WANTED: Plastic of all kinds—virgin, reground, lumps, sheet and reject parts. Highest prices paid for Styrene, Polyethylene, Acetate, Nylon, Vinyl, etc. We can also supply virgin & reground materials at tremendous savings. Address your inquiries to: Gold-Mark Plastics Compounds, Inc., 4-05 26th Ave., Long Island City 2, N. Y. RAvenswood 1-0880.

GET THE TOP MONEY FOR PLASTIC SCRAP: Now paying top prices for all thermoplastic scrap. Wanted: polystyrene, cellulose acetate, vinyl, polyethylene, butyrate, acrylic, nylon. All types and forms including rejects and obsolete molding powders. Fast action wherever you are located. WRITE, WIRE TODAY! Reply Box 5601, Modern Plastics.

WANTED: All types of plastic scrap and surplus inventories such as: styrenes, butyrates; acetates, acrylics and polyethylenes in any form. White. Wire or Phone Collect. Humboldt 1811. Philip Shuman & Sons, 15-33 Goethe Street, Buffalo 6, New York.

VINYL & POLYETHYLENE WANTED: Top prices paid for poly scrap, vinyl bleederstock (off grade). Send offers to: Kent, Inc., 830 Monroe Street, Hoboken, N. J.

(Continued on page 253)

Your Modern Plastics Encyclopedia Issue contains 1,218 pages of answers to questions like these:

"In *designing* plastic products, what factors govern the choice of surface decoration? Which features give added impact strength to thin edges? What can be done to correct warpage?"

"How do you set up a *cost estimate* for custom injection molding work? How do you set one up for compression and transfer molding?"

"How deeply have *Japanese* plastic materials penetrated the American market?"

"Why are epoxy resins especially recommended in *casting compositions* for use in encapsulation and potting of electrical and electronic components?"

"How are the styrene blends affected by strong acids?"

"What markets have opened up for *vinyl plastisol* materials?"

"What *special techniques* and formulations have been developed for the foaming of reaction-type phenolic resins?"

"What *printing method* is most commonly used in producing printed packaging films? And why is there a swing toward this process among decorators of light-gage polyethylene?"

"In reinforced plastics, what are the pros and cons of *matched-metal die molding?*"

"Where can you purchase electronic heat sealing machines?"

"Who are some custom molders and extruders around Cincinnati?"

What's your question?

(*Continued from page 251*)

TEFLON SCRAP WANTED: Increase your profits by handling your scrap properly, and selling it at top prices. Call or write us today for our suggestions. Davies Nitrate Co., Inc., 114 Liberty Street, New York 6, New York.

Molds for sale

FOR SALE: Used molds for plastic toys and housewares for sale. Contact E. Kane, Great American Plastics Co., 650 Water St., Fitchburg, Mass.

HOOP MOLD FOR SALE: 2-Cavity small size Mini-Hoop mold for linear polyethylene and to produce one 16" and one 14½" hula-hoop per shot. Price complete, $2500.00. Samples available. Immediate delivery. Write Hammond-Hayes & Co., 1034 N. Washington, Lansing 6, Michigan.

Molds wanted

WANTED FOR EXPORT: Used molds for manufacture plastic chair stools, seats and backs compression or injection. Please send samples of actual items, specifications, catalogs and prices to Box 5611, Modern Plastics.

MOLDS WANTED: Wish to purchase molds for combs and sun glasses of all types. Submit full details, prices, etc., catalogue or samples. Monarch Sales Co., 513 San Bernardo St., Laredo, Texas.

Help wanted

PERSONNEL: Executive—Technical—Sale—Production. Employers and Applicants—whatever your requirements, choose the Leader in Personnel Placement. Cadillac Associates, Inc., Clem Easly—Consultant to Plastics Industry, 29 E. Madison St., Chicago, Ill.—Wabash 2-4800. Call, write or wire—in confidence.

PLASTICS SALESMAN: Spencer Chemical Company seeks a man with enthusiasm, drive and a desire for future progress in a plastics sales assignment. Previous sales experience desirable. Technical background also preferable but not necessary. Excellent opportunity for future advancement in a rapidly expanding organization. Please send resume of your experience, education, and salary requirements to: Field Sales Manager, Plastics Division, Spencer Chemical Company, 1004 Baltimore, Kansas City 5, Missouri.

EXTRUSION SPECIALISTS: Men with thorough knowledge and experience in set-up of extruded moldings and precision shapes, as well as close tolerance tubing, for permanent position in New York with old, established custom extrusion company. We are looking for men with actual working knowledge, not administrators. Assistance would be given in relocation. Position offers chance for advancement. Reply Box 5603, Modern Plastics.

WANTED: Aggressive sales representatives for custom extrusion firm. We are looking for men with engineering background who can assist customers with extrusion applications and with initiative to build up business on their own. We are well established, located in New York, with large extrusion and extrusion-fabrication facilities, now selling nationally. The following states are open: Alabama, Florida, Georgia, Iowa, Kentucky, Mississippi, Missouri, Carolinas, Tennessee, Texas, Virginia, and Wisconsin. Reply Box 5602, Modern Plastics.

DEVELOPMENT ENGINEER: Recent graduate or individual with equivalent experience for work in plastics laboratory in Chicago (Calumet) area. Studies of resins, reinforcements, manufacturing processes, and product development. Opening offers opportunity in new expanding activity by established company. Reply Box 5612, Modern Plastics

SALES REPRESENTATIVES WANTED, by young, expanding, aggressive laminating company. We laminate and coat plastic films, fabrics, paper and metallized products in continuous rolls to 60" wide, for use by both industrial and novelty manufacturers. Desirable exclusive territories open on commission basis. Reply stating territory desired to: Lamart Corporation, 2 Waldo Street, Clifton, New Jersey.

VINYL CHEMIST: B.S. in Chemistry or Chemical Engineering. Experience in raw material evaluation for vinyls. Capable of handling complete laboratory customer service and possible field sales engineering. Good opportunity with medium sized expanding chemical specialty manufacturer. Send complete resume including salary required and picture if available. All replies treated with strict confidence. Reply Box 5613, Modern Plastics.

CHEMIST, ORGANIC: Wonderful opportunity with young, but financially strong company just starting in cast acrylic sheets. The sky is the limit for person with acceptable qualifications. Reply Box 5614, Modern Plastics.

SALES REPRESENTATIVES: Wanted by Custom Plastic Injection Molding company located in New York State. We are interested in men or organizations now calling on Industrial accounts. We have the most modern up-to-date facilities available, specializing in large volume Automatic Molding of small items, such as, cigar mouth-pieces, closures, spouts and aerosole components, etc. Choice territories. Give resume. Confidential. Reply Box 5616, Modern Plastics.

ENGINEER: Good opportunity with rapidly growing company. Background in compression molding or matched metal molding of reinforced plastics essential; experience with hydraulic circuits desired. State personal data, professional background, salary expected. Marplex Co., 348 Washington St., El Segundo, California.

VACUUM FORMING TECHNICIAN by Southeastern Plastic Manufacturer, AAA-1 Dun and Bradstreet rating. Should be familiar with mold design and various forming methods. Box 5617, Modern Plastics.

PLASTICS TECHNICIAN: Pigment sales company is interested in a technician experienced in the formulation and processing of thermoplastic resins for its technical service laboratory. Working knowledge of equipment such as the two-roll mill and extruder essential. Background in pigment application very helpful. Our staff knows of this advertisement. Ciba Company, Inc., Pigment Division, Fair Lawn, New Jersey.

PLASTICS ENGINEER: Excellent opportunity for up and coming plastics engineer to join executive staff of AAA1 mfr. of Toys and Playthings, in N.Y.C. Must be familiar with design of injection-vacuum molds, related pigs and dies, etc. To take charge of large tooling program and to handle liaison with moldmaking shops and own plant. Should be able to do some work on drafting board, but will be concerned mainly with coordinating efforts of product designers—moldmakers and production personnel. Unlimited advancement for aggressive self starter that can get things done with a minimum of supervision from above. Write complete details to Box 5618, Modern Plastics.

MANUFACTURERS REPRESENTATIVE WANTED: For internationally known line of electronic heat sealing machines and dielectric heaters. We are seeking aggressive representation for choice territories. Excellent tie-in possibilities with high remuneration—leads furnished. Fine opportunity for live rep with following in the plastics field. Some knowledge of heat sealing desirable. Submit complete details in first letter—all replies confidential. Reply Box 5619, Modern Plastics.

PLASTICS RESEARCH AND DEVELOPMENT: Leading Chemical and Plastics Manufacturing Company in Delaware Valley area seeks a young enterprising chemist, physicist, or engineer for physics laboratory. Stimulating research and development program on physical properties of materials, primarily plastics for use in aircraft, architecture, automotive, and other commercial applications. Write full details of training, general background and salary expected to: Rohm & Haas Company, Department O.T.E. #6, 5000 Richmond Street, Philadelphia 37, Pa.

HELP WANTED: Engineers—Plant supervisory people. Operators—Molders—Extruders. Salesmen—Designers (Product). For—Blow Molding—Extruded and Blown. Film Sheeting—Vacuum forming. We at Loma Plastics, Inc. are expanding Texas style. New 250,000 plant on 50 acre lot. We find that we can buy or build the equipment without difficulty. However, trained people are our problem. We need help! Only those interested in making money, and a promising tomorrow today—need apply. Write to me directly giving full particulars of your background, your aspirations. Louis H. Barnett, Pres., Loma Plastics, Inc., P. O. Box 11277, Fort Worth, Texas.

CHIEF ENGINEER: To head research and development for aggressive manufacturer of fiber glass boats. Must have extensive knowledge of fiber glass layup. Boat experience preferred. Send resume to: Reply Box 5620, Modern Plastics.

EXCELLENT OPPORTUNITY: for young man to join the Technical Department of the expanding Plastics Division of Spencer Chemical Company. This man should have a strong background in chemical engineering or chemistry with a minimum of three years' experience in the field of polyolefins. He will conduct studies on extrusion and molding of polyolefins and nylon, and have intimate contact with field technical service work. In reply, please send detailed resume of experience, education, and salary requirements to: Personnel Manager, Spencer Chemical Company, 610 Dwight Building, Kansas City 5, Missouri.

TEFLON EXTRUDER: Leading electronic component manufacturer looking for man with experience in Teflon extruding. Excellent opportunity. Salary commensurate with experience. Write full details in first letter. All replies kept confidential. Reply Box 5621, Modern Plastics.

HELP WANTED—SALESMAN: Nylon parts manufacturer seeks aggressive successful manufacturers' representative now calling on window manufacturers and similar type metal fabricating and assembly concerns. All replies confidential. Security Plastics, 4295 East 11th Avenue, Hialeah, Florida.

PLASTICS SALES, OPPORTUNITY UNLIMITED: There are several openings in sales and sales development in Enjay's new polypropylene organization for Chemists, Chemical Engineers and Mechanical Engineers. Plastics experience is desirable, but not necessary. For aggressive, vigorous men with ability to grow with the organization, this is an outstanding opportunity. Please send detailed resume to Enjay Company, Inc., Personnel Division, 15 West 51st Street, New York 19, New York.

MFG. ENGINEER: Leading consumer goods mfgr. has excellent opportunity for a Plastics Engineer with manufacturing background. Experience in plastics processing, industrial engineering, and cost analysis required and a background in production supervision preferred. Location Southern California. Benefits include relocation expenses. Submit complete resume in confidence to Box 5622, Modern Plastics.

PRODUCT DEVELOPMENT ENGINEER: Must have degree in engineering and several years of experience in the development and manufacture of reinforced plastic articles. Responsibilities will involve investigations primarily in the laboratory and pilot plant at our Research and Engineering Center in North-Central New Jersey, 35 miles from New York City. Please send reply giving details of education, professional experience and salary requirements to Personnel Manager, Johns-Manville Research Center, Manville, New Jersey.

CHEMICAL ENGINEERS: Responsible, challenging positions in dynamic growing company whose business is the manufacture, converting & sale of plastic films for packaging. Positions in Greenville, S.C.; Cedar Rapids, Ioda; & Cambridge, Mass. All positions offer mucs better than average opportunity for advancement to technical supervisory status. Qualified candidates considered for immediate supervisory positions. Mechanical experience an extra asset. Compensation commensurate with individual ability & experience. Write, giving experience and education, to R. H. Tucker, W. R. Grace & Co., Cryovac Division, 62 Whittemore Avenue, Cambridge 40, Massachusetts. Inc., 125 Roberts Road, Waltham 54, Massachusetts.

(*Continued on page 255*)

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(Continued from page 253)

MANUFACTURERS REPRESENTATIVE: Midwest manufacturer of Polyurethane Foam slab stock and fabricated parts seeks agent for Chicago and Cleveland Territories. Prefer man who is familiar with the widespread industrial and novelty markets for this rapidly growing industry. Reply stating experience and territory covered to Box 5623, Modern Plastics.

POLYESTER SALES: We require the services of five top men to call on the reinforced plastics trade for the following locations: West Coast, Texas, Florida, Mid West and North East. You will sell Polyester resins, organic peroxides, fiberglas mat, glass cloth and pigments from plants or factory warehouse in your area. Excellent salary and commission to top men. Write or call C. J. Hauck, President American Alkyd Industries, Carlstadt, N. J. GEneva 8-4332.

HELP WANTED: Experienced salesman to sell service of grinding and to purchase scrap plastic, eastern U. S. Write age, experience, and salary you expect to earn. Answers treated confidentially. Reply Box 5624, Modern Plastics.

TECHNICAL SALESMEN — PLASTICS: For a dynamic organization engaged in the manufacture and sale of raw materials for the plastics, rubber and paint industries. Our primary product is Cycolac; a high impact thermoplastic resin sold to molders, extruders, and calenderers. Our rapid growth has created openings for additional salesmen who are looking for the opportunity to build a future in a market and with a company that offers tremendous potential. The men we are seeking have been selling from one to three years, preferably in the plastics or rubber industries. Technical background either through college or work experience is preferred because the nature of our business is such that our sales representatives need to understand product application. Salary, plus incentives. Car furnished. Write immediately to: E. M. Mills, Marbon Chemical Division of Borg-Warner, Box 68, Washington, West Virginia.

WANTED: Plastics Injection Molding Machine Man For Maintenance And Equipment Upkeep—Must Be Experienced. Also A Man For Tool And Die Shop In Injection Molding Plant—Must Be Experienced. Lustro Tile Products Corporation, Akron, Ohio—POrtage 2-8801.

SUPERINTENDENT OF MIXING AND COMPOUNDING DIVISION: Technical experience should be in mixing and compounding molding powder for extrusion purposes. Should have minimum of five years supervisory experience. Position open—waiting for right man to begin installation of equipment and organize production of this new division of growing New England plastic sheeting manufacturer. Submit complete resumes and salary requirements to Box No. 5625, Modern Plastics.

PRODUCTION MANAGER: With M.E. Degree or Practical experience equivalent. Medium sized growing company in Mass. requires man with broad experience in polyethylene converting field, covering extrusion, printing, bag making, and engineering. Must be able to handle and train personnel. Salary open. Send resume. Application held in strict confidence. Reply Box 5627, Modern Plastics.

ADHESIVE AND COATING DEVELOPMENT CHEMIST: Major experience with Epoxy, Polyester and Urethane formulations. Minor background with other cross linking resins plus Synthetic Elastomers. B.S. in chemistry or chemical engineering and minimum of 3 years active laboratory development work required. Excellent opportunity with aggressive nationally known company in the specialty adhesive field. Write or call TW 4-3650. S. O. Ames, Compo Chemical Company, Inc., 125 Roberts Road, Waltham 54, Massachusetts.

PLASTISOLS AND ORGANOSOLS: Vinyl Dispersions Chemist. This opportunity to join one of the country's foremost pioneers in the field of vinyl dispersions is made possible by our continued growth and expansion. Established current business, plus new product developments, have created the need for a top-grade man in our Plastics Department. The man we are looking for may now be the Number 1 man in an organization who feels that he has no further opportunity for personal growth and development—or he may be the Number 2 man who, for various reasons, can advance no further. To the man who is a self-starter, has ambition and imagination, along with ability in the formulation of customized plastisols, organosols, etc., we offer a chance for personal recognition. Our company is not an extremely large one, and individual effort does not go unrecognized. Salary is open—depending upon what you have to offer. Along with a detailed resume of your background and experience, include a general statement of your salary requirements. Applications will be held in confidence. Reply Box 5626, Modern Plastics.

PACKAGE AND CONTAINER SALES REPRESENTATIVE: To develop sales nationally in the field of large plastic molded containers, such as drums, carboys, large cans, and boxes. Exclusive new developments in manufacturing processes and equipment will assist toward creating volume sales. Representation desired in East, Midwest, West and South. Complete background and experience necessary to allow consideration. Eclipse Plastic Industries, Inc., P. O. Box 430, Sarasota, Florida.

SALES REPRESENTATIVES WANTED: Areas open for plastic machinery representatives to sell a complete line of leading blow-molding machines and auxiliary equipment. In reply please outline the geographic area and company affiliations your current activities cover. Reply Box 5643, Modern Plastics.

REPRESENTATIVE WANTED: Blane setting up separate division to handle rising sales volume color concentrates. Looking —Several representatives carrying allied lines calling on wire, cable plants, molders, extruders. Nationally adv. full quality line—all territories open. Liberal compensation. Write Blane Corp. Canton, Mass.

POLYESTER RESIN CHEMISTS: 3-6 years experience in formulation and application of polyester resins, wanted for development and technical service. Excellent position with an aggressive, rapidly growing company. Salary open. Call or write American Alkyd Industries, Carlstadt, N. J. GEneva 8-4332.

BLOW MOLDING EXTRUSION SUPERVISOR: Thoroughly experienced, technical know-how; must be top-notch extrusion man; able to run expanding Blow Molding Department. Growing firm, Metropolitan New York Area. Progressive Management, Excellent Opportunity. Write in confidence, state exoerience, earnings, education, age. Reply Box 5644, Modern Plastics.

SALESMAN—PLASTIC COLORANTS: Progressive company needs experienced salesman to sell plastic chips for use in extrusion processes. Knowledge of extrusion equipment desirable but not necessary. Excellent opportunity for a man who has contacts in this field. Salary open. Please send resume of experience and education to Box 5645, Modern Plastics.

BLOW MOLDING SUPERINTENDENT: With experience also in extrusion wanted by New England plant. Our company is new but growing rapidly and offers good salary with excellent opportunity for advancement. Please send resume and salary requested to The Blow-O-Matic Corp. Box 9100, Bridgeport 1, Conn.

POLYESTER RESIN CHEMIST: Rapidly growing manufacturer of Pleogen Polyester Resins seeks Chemist experienced in formulation and application of polyester resins and molding compounds for matched die molding. Excellent opportunity for the right man. Work will involve formulation as well as technical service calls. Mol-Rez Division, American Petrochemical Corporation, Minneapolis 18, Minn.

PRODUCT DEVELOPMENT ENGINEER HOUSEWARES AND SMALL APPLIANCES: Experienced product engineer in the field of housewares, small appliances or consumer packaging—to develop new products from the appearance design idea to the production stage. Determines proper materials and specifications for glass, and associated plastics, metals and packages. Coordinates tooling schedules, and process and assembly development. Develops suppliers for purchased parts. Produces preproduction quantities for market testing. Apply—Mgr. Technical Employment, Corning Glass Works, Corning, New York.

REGIONAL SALES MANAGERS FOR PLASTIC PIPE: Unusual opportunity with well established, aggressive manufacturer for three men with successful sales experience in plastic pipe on distributor level. We have openings in (1) Northeastern states, (2) Midwest and (3) Southeastern states. Excellent salary plus incentive and travel expenses. Wonderful growth opportunity. Reply in strict confidence to arrange interview. Dept. M, Consolidated Pipe Company of America, 1066 Home Avenue, Akron 10, Ohio.

PLASTICS FOREMEN: Large polyethylene extrusion plant seeks two shift foremen. Challenging position for men with three or more years experience in extrusion of top quality, lay flat tubing and sheeting for packaging industry. Many company benefits. Reply in confidence to Box 5646, Modern Plastics.

Situations wanted

MANUFACTURER'S REPRESENTATIVE: Can sell stock plastic parts such as knobs, handles, clips, coil forms, gears, pulleys, brush caps and other industrial plastic parts from stock molds and dies. Presently handle custom molded plastics only to industrial accounts Chicago, N. Illinois, and S. Wisconsin area. Reply Box 5604, Modern Plastics.

REINFORCED PLASTICS ENGINEER, with experience in technical service, young, ambitious, seeking position. Reply Box 5628, Modern Plastics.

PLASTICS SALES MANAGER: 5 years experience in production and 10 years as sales manager seeks extrusion company that is technically good but needs sales help. Experience in selling shape extrusions, film, laminations, molded items. Knows markets nationally, has good following. Reply Box 5629, Modern Plastics.

URETHANE FOAM CHEMIST: Presently employed as Assistant Research Director of major urethane producer. Ph.D. 15 years experience in urethane foam, latex foam, and urethane elastomers. Thorough knowledge of management, production, research. Cost and quality conscious. Qualified to direct research and development or production. Reply Box 5630, Modern Plastics.

PLANT SUPERINTENDENT AND TECHNICAL DIRECTOR: Age 38. Experienced in setting up new plants; aggressive, able to make decisions and delegate responsibility. Excellent background in Fiberglas Reinforced Plastics, Melamine Moulded Products, Epoxies, Laminating and Vacuum Forming of Rigid Thermoplastic Laminates, Rigid Foamed-in-Place Polyurethanes. Willing to relocate. Reply Box 5631, Modern Plastics.

CONSULTANT SERVICES available on Fiberglas Reinforced Plastic Structures. Experienced in other phases of reinforced plastics, thermosetting Plastics such as Melamines, Epoxies and others; Thermoplastic Laminates and Vacuum Forming; Rigid Foamed-in-Place Polyurethanes; operating from Ohio. Reply Box 5632, Modern Plastics.

PLASTIC ENGINEER: Development, experimental production, Thermoplastic and Thermosetting materials. Injection, transfer, compression molding. Mold design; mold and production estimates. Some extrusion experience. Desires responsible position with progressive company, preferably in the New York, New Jersey, Connecticut area. Reply Box 5633, Modern Plastics.

(Continued on page 257)

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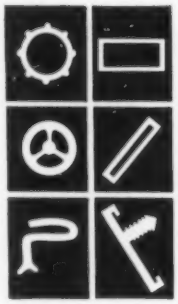

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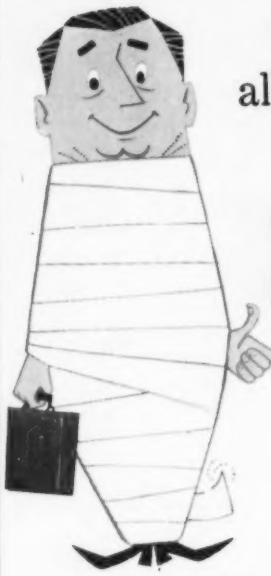

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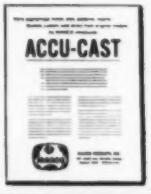

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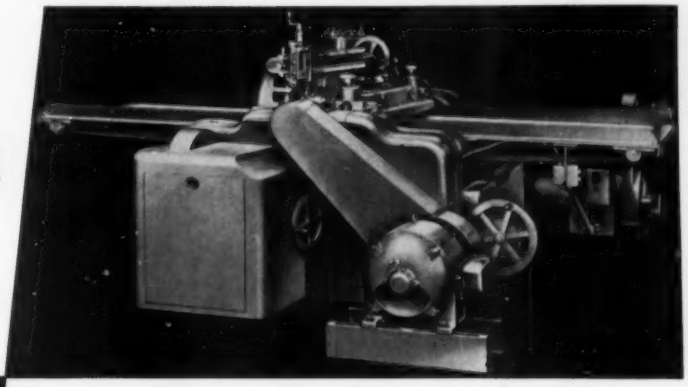

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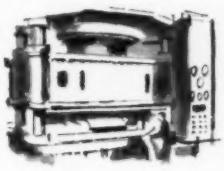

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TEXACO

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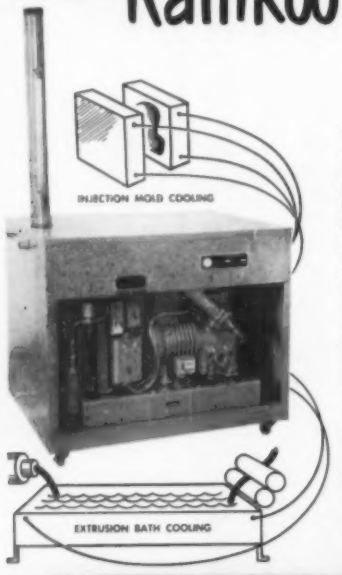

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Width	29	30	34
Height	36	36	42
Weight #	650	700	1050
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#/hr. Injection @ 40°F.	75	125	190
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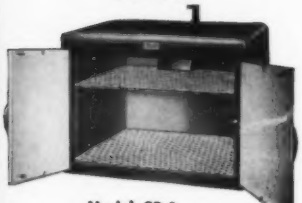

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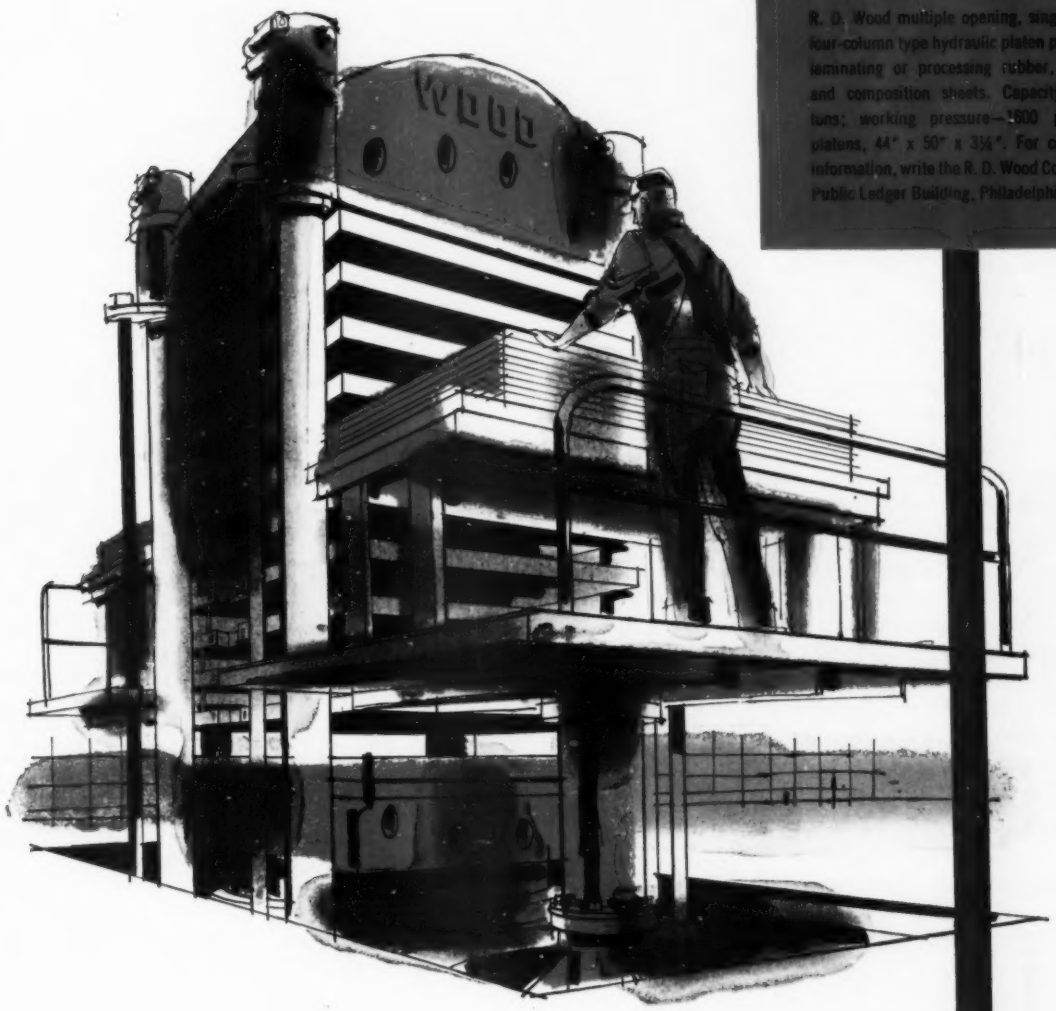

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EDITORIAL

Hazards in film misuse must be taught parents

A lot of newspaper publicity has attended the death of a few infants (under a year old) and one child (2½ years old) reportedly by suffocation in polyethylene film.

Seems that one mother used the discarded film from a dry-cleaned suit to cover a crib mattress, others gave infants and tots empty shirt and vegetable bags to play with unsupervised.

The very light, limp film has an electrostatic or clinging quality, and when it covers an infant's face, the breath intake can draw it tight around the nose. A tot over a year old, unless panicky, could pull it away; an infant of six months might not.

Automobiles, knives, scissors, insecticides, crib blankets, fires, boiling water, cleaning fluids kill children every day—15,000 a year under 15 years of age. Are the products blamed? No! Adults are blamed—mainly parents. And rightly so.

This lightweight film, while non-poisonous, pretty, and most useful in a thousand places, rates as a hazard if misused by tiny children. Parent education is the only answer.

Of course, the newspapers and wire services queried the National Safety Council, and a meeting was held between that organization and representatives of film and material makers under S.P.I. auspices. At this time plans were drawn up for an educational program by N.S.C. directed to parents, informing them that this useful film should be kept out of the crib and should not be used as a plaything. But it's just fine for lining garbage cans, wrapping paint brushes, and other adult re-uses. Otherwise it should be destroyed. It was made and costed to be disposable.

The techniques of parent education and the media are known to every public relations man in the plastics industries. Without panic, but with clear intent and with cooperation from the N.S.C., the American Medical Association, and similar bodies, it can—and must—be done.

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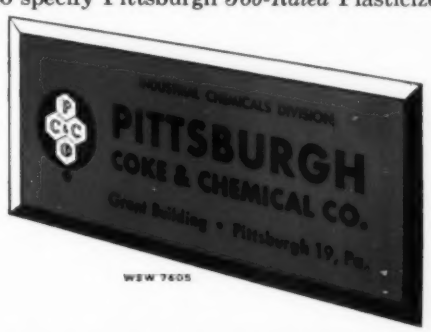

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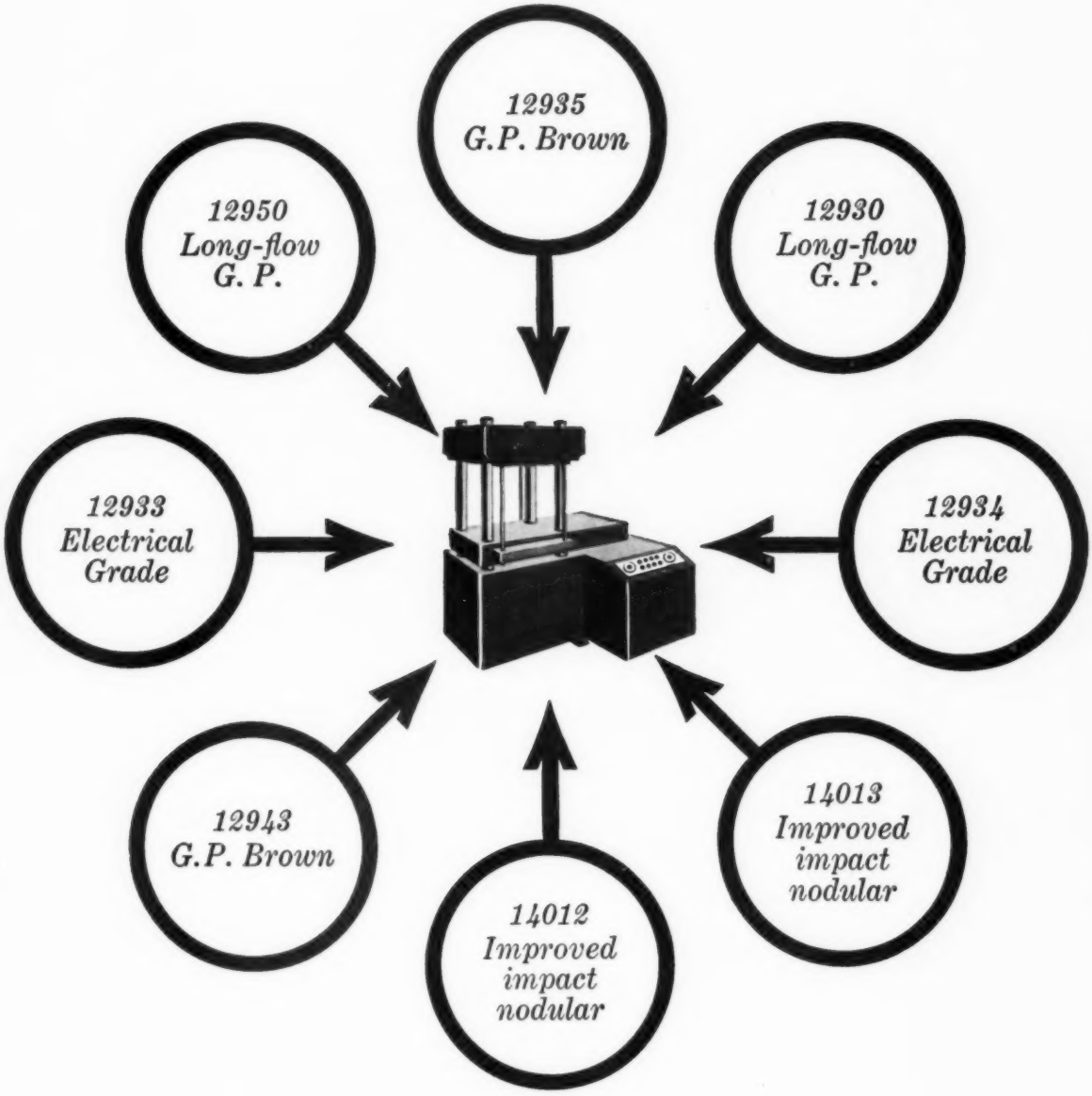

EIGHT NEW PHENOLICS FOR ONE GOOD REASON . . . MOLDERS AND END-USERS NEEDED THEM!

During the past year eight new G-E phenolic molding powders graduated from the laboratory to salesmen's catalogs: two improved-impact nodulars; two electrical grades; two long-flow GPs; and the two fastest curing browns available anywhere.

Why these additions to our line? Because parts molded from phenolics are becoming ever more complex, performance specifications more critical. To get needed combinations of properties, molders and end-users need a wider choice of compounds.

G-E sales and technical service people are alert to these new and changing needs of the industry. Our research and production staffs find the means to translate them into new compounds for new and existing applications. In a word, G-E is *customer-oriented.*

This is one more good reason why it pays to discuss your phenolic molding problems with a G-E representative. If you'd like him to get in touch with you, write General Electric Company, Section MP-69, Chemical Materials Dept., Pittsfield, Mass.

Phenolics-first of the modern plastics ...first in value

GENERAL ELECTRIC